

ABB INDUSTRIAL DRIVES

ACS880-1607 DC/DC converter units

Hardware manual



List of related manuals

General manuals

	Code (English)
Safety instructions for ACS880 multidrive cabinets and modules	3AUA0000102301
Electrical planning instructions for ACS880 multidrive cabinets and modules	3AUA0000102324
Mechanical installation instructions for ACS880 multidrive cabinets	3AUA0000101764

Supply unit manuals

ACS880-207 IGBT supply units hardware manual	3AUA0000130644
ACS880 IGBT supply control program firmware manual	3AUA0000131562
ACS880-307 +A003 diode supply units hardware manual	3AUA0000102453
ACS880-307 +A018 diode supply units hardware manual	3AXD50000011408
ACS880 diode supply control program firmware manual	3AUA0000103295
ACS880-907 regenerative rectifier units hardware manual	3AXD50000020546
ACS880 regenerative rectifier control program firmware manual	3AXD50000020827
Parallel-connected ACS880-207 IGBT supply units system description	3AXD50000032517
Parallel-connected ACS880-307 +A018 diode supply units system description	3AXD50000032421
Parallel-connected ACS880-907 regenerative rectifier units system description	3AXD50000036609

Inverter unit manuals and guides

ACS880-107 inverter units hardware manual	3AUA0000102519
ACS880 primary control program firmware manual	3AUA0000085967
ACS880 primary control program quick start-up guide	3AUA0000098062

Brake unit and DC/DC converter unit manuals

ACS880-607 1-phase brake units hardware manual	3AUA0000102559
ACS880-607 3-phase brake units hardware manual	3AXD50000022034
ACS880 brake control program firmware manual	3AXD50000020967
ACS880-1607 DC/DC converter units hardware manual	3AXD50000023644
ACS880 DC/DC converter control program firmware manual	3AXD50000024671

Option manuals and guides

ACX-AP-x assistant control panels user's manual	3AUA0000085685
Drive composer start-up and maintenance PC tool user's manual	3AUA0000094606
ACS880+C132 marine type-approved drive cabinet supplement	3AXD50000039629
Manuals and quick guides for I/O extension modules, fieldbus adapters, safety options etc.	

You can find manuals and other product documents in PDF format on the Internet. See section [Document library on the Internet](#) on the inside of the back cover. For manuals not available in the Document library, contact your local ABB representative.

Hardware manual

ACS880-1607 DC/DC converter units

Table of contents



3. Mechanical installation



5. Electrical installation



8. Start-up



Table of contents

1. Introduction to the manual

Contents of this chapter	9
Applicability	9
Safety instructions	9
Target audience	9
Contents of the manual	10
Related documents	10
Categorization by frame size and option code	10
Use of component designations	10
Terms and abbreviations	11

2. Operation principle and hardware description

Contents of this chapter	13
Operation principle	14
Main circuit diagram	15
Overview diagram of a drive with a converter unit	17
Converter unit hardware	18
Cabinet layout	18
R8i DC/DC converter module	22
BDCL filter module	23
Overview of the control connections on the BCU control unit	24
DC/DC converter control devices	25
DC switch/disconnector (option +F286)	25
Charging switch	25
Door lights	26
ACS-AP-x control panel (option +J400)	26
PC connection	26
Fieldbus control	26
Type designation labels	27
Type designation label of the DC/DC converter unit	27
Type designation labels of the DC/DC converter module	28
Type designation label of the BDCL filter module	29
Type designation keys	30
Type designation key of the converter unit	30
Type designation key of the converter module	32
Type designation key of the filter module	32

3. Mechanical installation

Contents of this chapter	33
DC/DC converter units	33
Energy storage	33

4. Guidelines for planning electrical installation

Contents of this chapter	35
Limitation of liability	35



Generic guidelines	35
Selecting the energy storage	36
Implementing protections	37
General principles	37
Selecting the protective circuit breaker of the energy storage	37
Energy storage disconnecting device	37
Overload protection of the system by the DC/DC converter	37
Protecting the energy storage cable	38
Energy storage discharging device	38
Implementing an interlocking between the disconnecting devices	38
Selecting and routing the energy storage cables	38
Recommended cables	38
Typical cable sizes	38
Minimizing electromagnetic interference	39
Maximum cable length	39
EMC compliance of the complete installation	39
Parallel connection of the DC/DC converter units	40

5. Electrical installation

Contents of this chapter	41
Safety	41
Electrical safety precautions	42
General notes	43
Static electricity	43
Optical components	43
Checking the insulation of the energy storage cable	43
Connecting the control cables for the converter unit	45
Default I/O connection diagram	45
Connection procedure of control cables	45
Grounding the outer shields of the control cables at the cabinet cable entry	45
Connecting the energy storage cable and load disconnected indicator cable	48
Connection diagram	48
Connection procedure of the energy storage cables	49
Connection procedure of the load disconnected indicator cable	50
Installing optional modules	51
Connecting a PC	52

6. Control unit

Contents of this chapter	53
General	53
Default I/O connection diagram	54
External power supply for the control unit (XPOW)	55
SDHC memory card slot	55
Drive-to-drive link (XD2D)	55
Layout and connections	56
Control unit connector data	58
Ground isolation diagram	60

7. Installation checklist

Contents of this chapter	61
Warnings	61



Checklist	62
-----------------	----

8. Start-up

Contents of this chapter	63
Start-up procedure	64
Safety	64
Checks/Settings with no voltage connected	64
Connecting voltage to the drive and converter control unit	64
Setting the parameters	65
Charging the DC/DC converter and connecting voltage to the converter	65
Connecting the energy storage to the DC/DC converter	65
Testing the DC/DC converter operation	65
Disconnecting the DC/DC converter with DC switch/disconnector (option +F286)	66
Safety	66
Stopping the DC/DC converter	66
Disconnecting the energy storage	66
Disconnecting the DC/DC converter	66
Working inside the DC/DC converter cubicle	66
Reconnecting the DC/DC converter with DC switch/disconnector (option +F286)	67
Safety	67
Reconnecting the DC/DC converter	67
Starting the DC/DC converter	67

9. Maintenance

Contents of this chapter	69
Maintenance intervals	70
Maintenance timers and counters	71
Cabinet	71
Cleaning the interior of the cabinet	71
Cleaning the door air inlets – IP22 and IP42 (option +B053, +B054)	72
Cleaning the inlet (door) filters – IP54 (option +B055)	73
Cleaning the outlet (roof) filters (IP54)	73
Power connections	74
Retightening the power connections	74
Fuses	75
Checking and replacing the DC fuses	75
Fans	77
Replacing the cabinet cooling fan	77
Replacing the speed-controlled cooling fan of DC/DC converter module	78
Replacing the direct-on-line fan (option +C188) of the DC/DC converter module	80
Replacing the circuit board compartment fan of the DC/DC converter module	82
Replacing the fan of the BDCL filter	85
Replacing the roof fan for IP54 cabinet (option +B055)	86
DC/DC converter module	87
Cleaning the module	87
Replacing the DC/DC converter module	88
BDCL filter	93
Replacing the BDCL filter	93
Capacitors	97
Reforming the capacitors	97
Control panel	98
Replacing the control panel battery	98



Cleaning the control panel	98
Control unit	99
BCU control unit types	99
Memory unit	99
Control unit battery	100
LEDs and other status indicators	101

10. Technical data

Contents of this chapter	103
Ratings	103
Definitions	105
Derating	106
Temperature derating	106
Altitude derating	106
Fuses	107
DC fuses (DC bus side)	107
Output DC fuses (energy storage side)	107
BDCL filters	108
Filter module data	108
Dimensions and weights	109
Free space requirements	109
Losses, cooling data and noise	110
Tightening torques	111
Cable lugs	111
Electrical connections	111
Mechanical connections	111
Insulation supports	111
Input power (DC bus) connection	112
Output power (energy storage) connection	112
Control accuracy – Current and voltage control performance data	112
Control unit connection data	112
Optical components	113
Degree of protection	113
Ambient conditions	114
Materials	115
Applicable standards	115
Markings	115
Disclaimer	116
Generic disclaimer	116
Cybersecurity disclaimer	116

11. Dimensions

What this chapter contains	117
Dimension drawings	118
Frame 1×R8i, bottom cable entry	118
Frame 1×R8i, top cable entry	119
Location and size of input terminals	120
Frame 1×R8i, bottom cable entry	120
Frame 1×R8i, top cable entry	120

Further information



1

Introduction to the manual

Contents of this chapter

This chapter gives basic information on the manual.

Applicability

The manual is applicable to ACS880-1607 DC/DC converter units that form a part of an ACS880 multidrive system.

Safety instructions

Follow all safety instructions delivered with the converter.

- Read the **complete safety instructions** before you install, commission, use or service the converter. The complete safety instructions are given in *ACS880 multidrive and multidrive modules safety instructions* [3AUA0000102301 (English)].
- Read the **software-function-specific warnings and notes** before changing the default settings of the function. For each function, the warnings and notes are given in the section describing the related user-adjustable parameters.
- Read the **task-specific safety instructions** before starting the task. See the section describing the task.

Target audience

This manual is intended for people who install, start-up and service the DC/DC converter units. Read the manual before working on the converter. You are expected to know the fundamentals of electricity, wiring, electrical components and electrical schematic symbols.

Contents of the manual

- [Introduction to the manual](#)
- [Operation principle and hardware description](#)
- [Mechanical installation](#)
- [Guidelines for planning electrical installation](#)
- [Electrical installation](#)
- [Control unit](#)
- [Installation checklist](#)
- [Start-up](#)
- [Maintenance](#)
- [Technical data](#)
- [Dimensions.](#)

Related documents

The multidrive user documentation consists of technical drawings and a set of manuals. The technical drawings are tailor-made for each converter. The composition of the manual set depends on the composition of the converter, eg, which converter unit type, options and control program has been ordered by the customer. The main manuals are listed on the back of the front cover.

As standard, the manuals are delivered in memory sticks. For the delivery options, see [Type designation key of the converter unit](#) on page 30.

Categorization by frame size and option code

Some descriptions, instructions, technical data and dimensional drawings which concern only a certain group of units are marked with the symbol of the frame size (such as “2×R8i”, etc.). The marking derives from the quantity and basic construction of the converter modules that form the converter unit. For example, frame size “2×R8i” indicates that the converter unit consists of two frame size R8i converter modules connected in parallel.

The frame size is marked on the type designation labels. The frame size of each converter module is also shown in the rating tables ([Ratings](#) on page 103).

The instructions and technical data which concern only certain optional selections are marked with option codes (such as +E205). The options included in the drive can be identified from the option codes visible on the type designation label. The option selections are listed in section [Type designation labels](#), page 27.

Use of component designations

Some device names in the manual include the item designation in brackets, for example [X50] to make it possible to identify the components in the circuit diagrams of the converter.

Terms and abbreviations

Term/Abbreviation	Description
BAMU	Voltage/current measurement unit
BCU	Type of a control unit
BDCL	L-filter. BDCL-14 and BDCL-15 filters are used with DC/DC converters.
Control board	Circuit board in which the control program runs
Control unit	Control board built in a rail-mountable housing
Cubicle	One section of a cabinet-installed drive. A cubicle is typically behind a door of its own.
DC/DC converter	DC/DC converter charges or discharges an energy storage (such as a battery or capacitors) in the DC bus.
DC/DC converter module	ACS880-104 R8i used as DC/DC converter module
DC/DC converter unit	DC/DC converter unit consists of <i>DC/DC converter module</i> and <i>BDCL</i> filter module.
DDC	DC/DC converter unit
DI	Digital input
DOL	Direct-on-line fan (option +C188)
Drive	Frequency converter for controlling AC motors
Energy storage	Device that stores electrical energy, for example, a battery or a super capacitor.
Frame (size)	Refers to power modules that share a similar mechanical construction, for example: <ul style="list-style-type: none"> • DC/DC modules of frame R8i • frame 2×R8i includes two size R8i DC/DC modules. To determine the frame size of a component, refer to the <i>Ratings</i> (page 103) tables in chapter <i>Technical data</i> .
INU	<i>Inverter unit</i>
Inverter	Converts direct current and voltage to alternating current and voltage.
Inverter unit	Inverter module(s) under control of one control board, and related components. One inverter unit typically controls one motor.
I/O	Input/Output
Multidrive	Drive for controlling several motors which are typically coupled to the same machinery. Includes one supply unit, and one or several inverter units.
Parameter	In the control program, user-adjustable operation instruction to the drive, or signal measured or calculated by the drive
PLC	Programmable logic controller
Single drive	Drive for controlling one motor
Supply unit	Part of the drive system that rectifies the AC supply voltage and outputs a DC voltage.
UPS	Uninterruptible power supply



2

Operation principle and hardware description

Contents of this chapter

This chapter describes the DC/DC converter operation basics and the hardware of the converter unit.

Operation principle

The DC/DC converter unit (DDC) transfers energy from a common DC bus of a drive into an external energy storage and discharges energy back to the DC bus. The energy storage can be, for example, a battery or super capacitor. The energy storage media does not belong to the converter unit delivery.

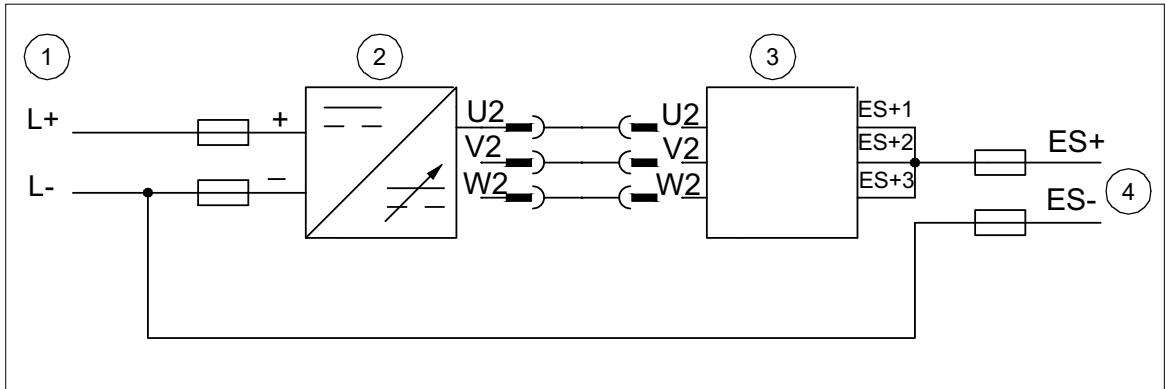
The DC/DC converter unit has a single converter module or parallel converter modules under the command of one BCU control unit. Parallel DC/DC converter modules must have a common energy storage. Each parallel module must have the output cabling of its own. We also recommend that you use identical cablings (cable type, cross-sectional area, and length) and have identical load for each module. For other solutions, contact ABB.

Typically, the DC/DC converter is used in marine applications for heave compensation, peak load compensation, propulsion supply in harbors, energy storage instead of an additional generator and so on. The DC/DC converter can also be used in automotive applications such as battery simulators for test benches and electric car charging systems and also in several other applications where energy storage and reuse is needed.

■ Main circuit diagram

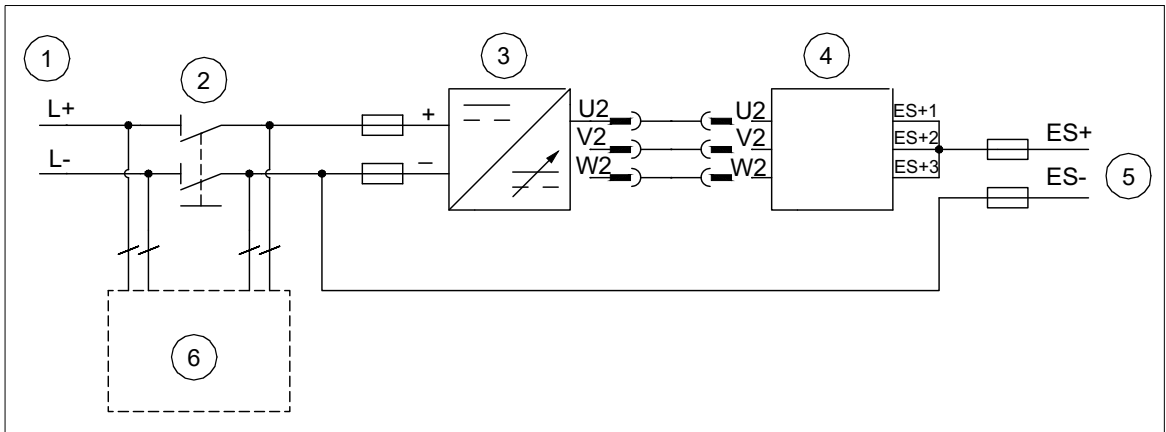
The DC/DC converter has output DC fuses and DC fuses on the drive DC-link side. You can also equip the converter with a DC switch/disconnector (option +F286).

This figure shows a simplified main circuit diagram of a DC/DC converter without the DC switch/disconnector and charging circuit.



	Description
1.	Drive DC bus
2.	DC/DC converter module
3.	Filter module
4.	Energy storage.

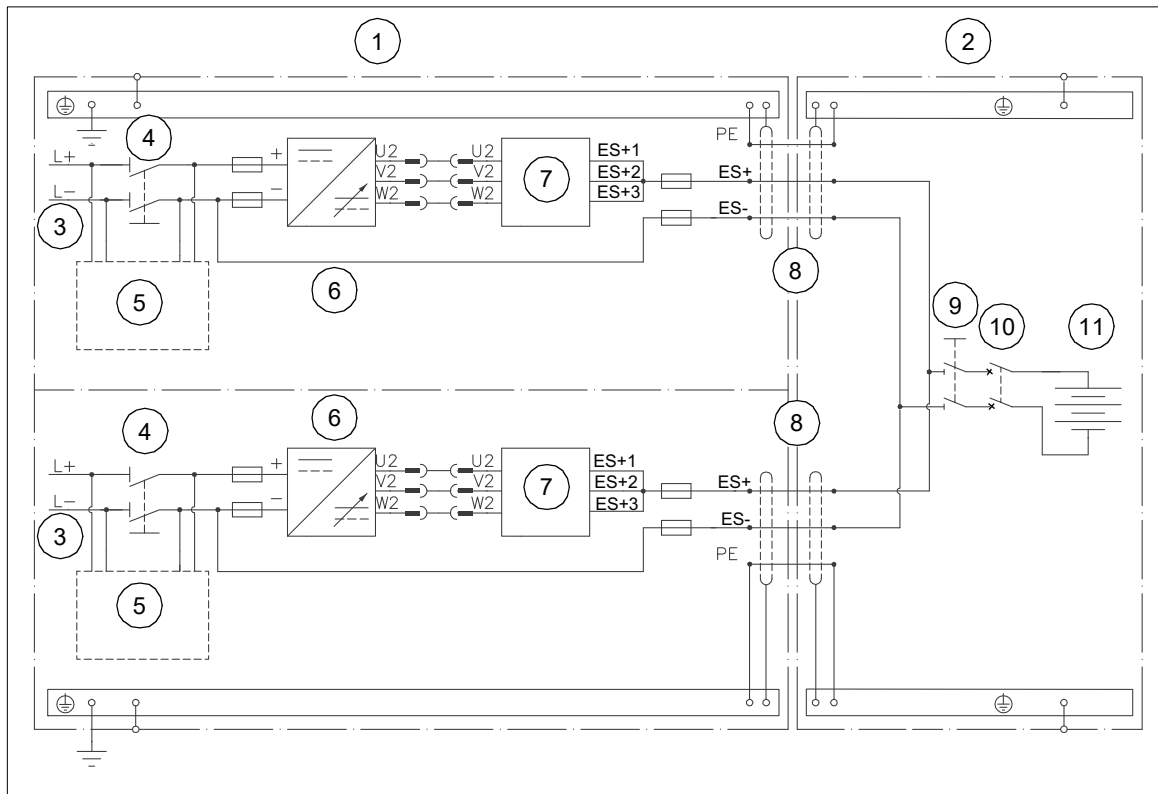
This figure shows a simplified main circuit diagram of a DC/DC converter with the DC switch/disconnector (option +F286) and charging circuit.



	Description
1.	Drive DC bus
2.	DC switch/disconnector (option +F286)
3.	DC/DC converter module
4.	Filter module
5.	Energy storage
6.	Charging components (belong to option +F286).

16 Operation principle and hardware description

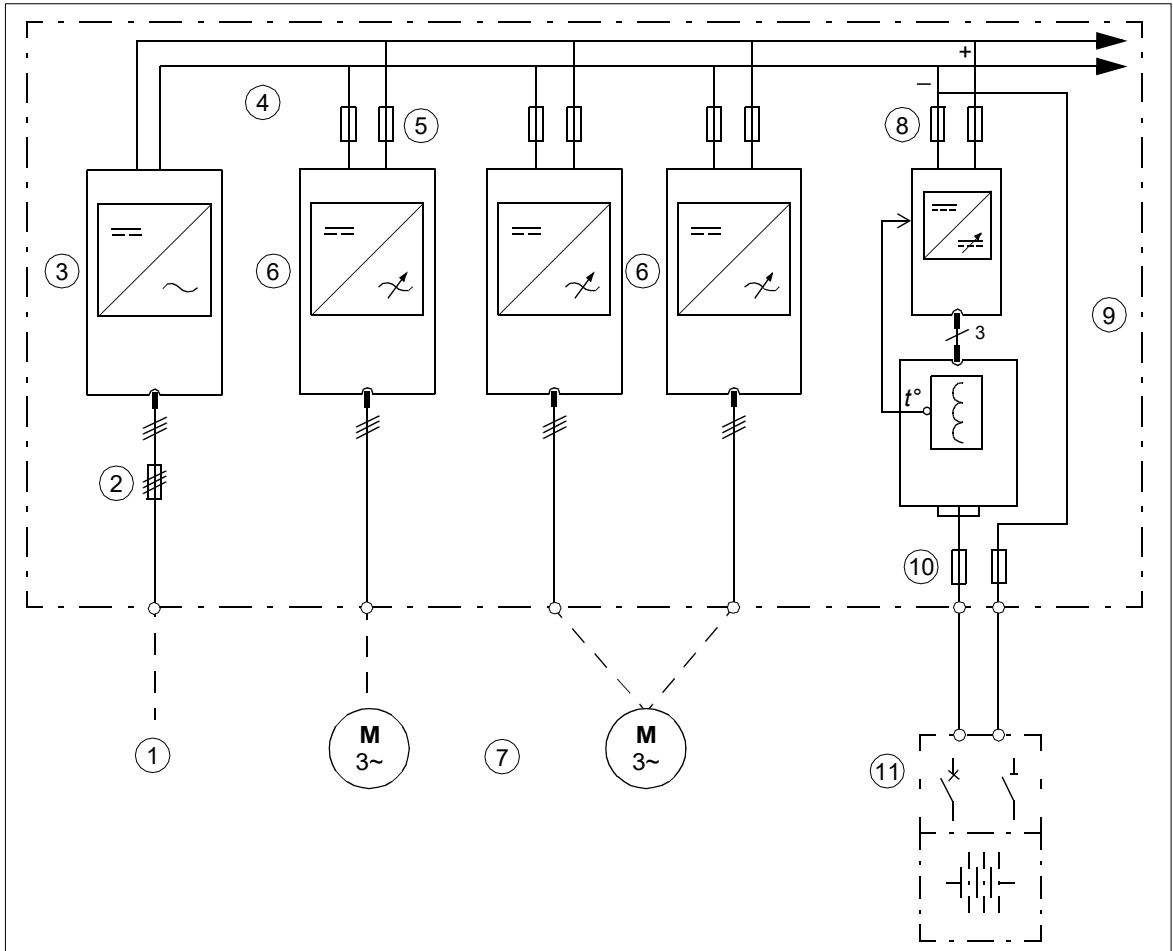
This figure shows a simplified main circuit diagram of parallel-connected DC/DC converter modules with the DC switch/disconnector (option +F286) and charging circuit. Also the energy storage and related cabling and equipment are visible.



	Description
1.	DC/DC converter cubicles
2.	Energy storage cabinet
3.	Drive DC bus
4.	DC switch/disconnector (option +F286)
5.	Charging components (belong to option +F286)
6.	DC/DC converter module
7.	Filter module
8.	Cabling between DC/DC converter unit and energy storage
9.	Energy storage disconnecting device
10.	Energy storage protective circuit breaker
11.	Energy storage.

Overview diagram of a drive with a converter unit

This diagram shows a possible application of a converter unit in an example system. The DC/DC converter unit includes a DC/DC converter module and a filter module.



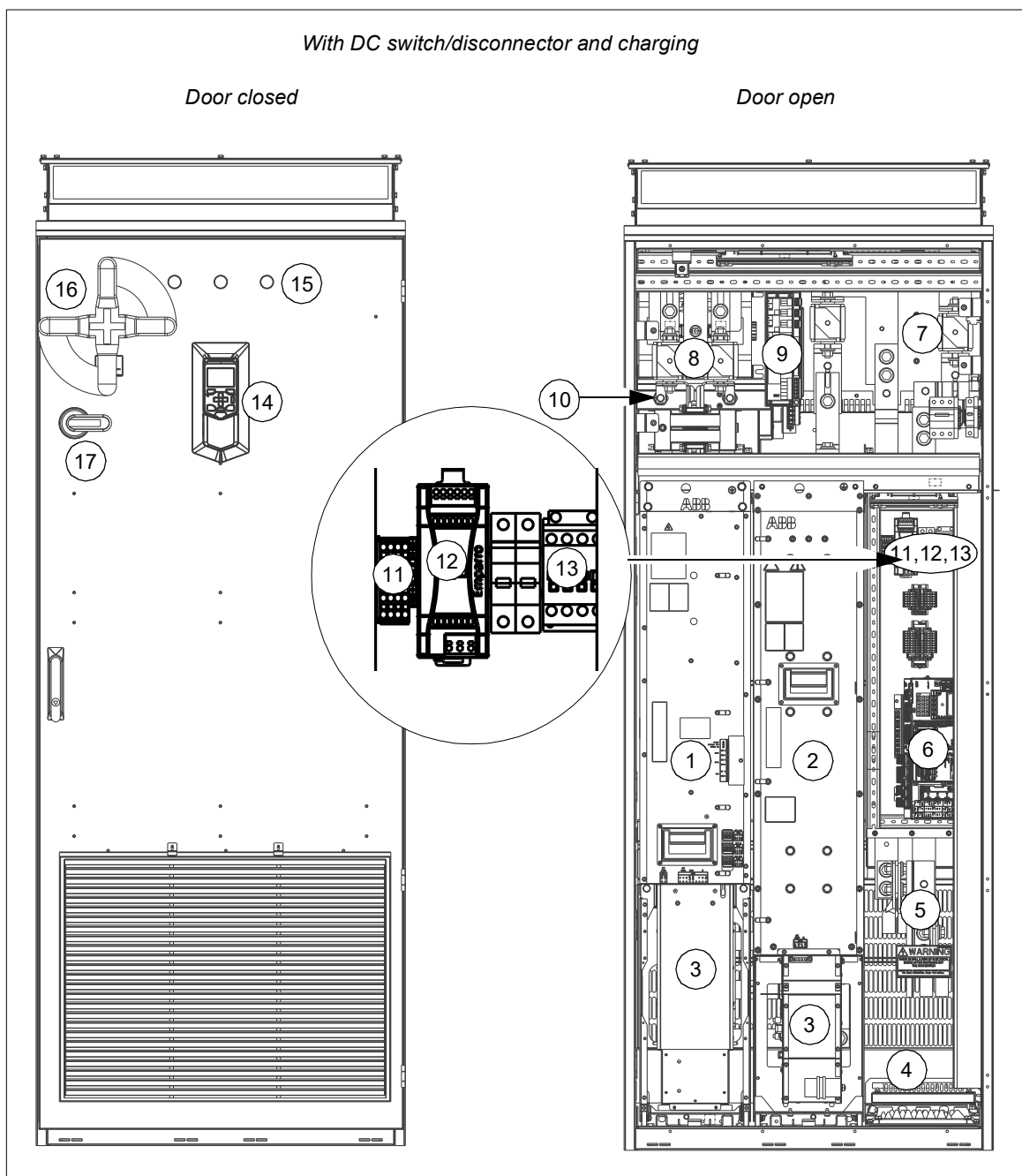
	Description
1.	AC supply
2.	Input (AC) fuses
3.	Supply module
4.	DC bus (-, +)
5.	Inverter DC fuses (with or without a DC switch/disconnector, option +F286)
6.	Inverter modules
7.	Motors
8.	DC fuses (DC bus side, with or without a DC switch/disconnector, option +F286)
9.	DC/DC converter unit (converter and filter modules)
10.	Output DC fuses
11.	Customer-defined energy storage with disconnecting and protection devices.

Converter unit hardware

Cabinet layout

The DC/DC converter cubicle includes a converter module, a BDCL filter module and a BCU control unit. Each converter is equipped with dedicated DC fuses; a DC switch/disconnector is optional (option +F286) but commonly used. A converter unit with a DC switch/disconnector also has a precharge circuit including a charging switch on the door.

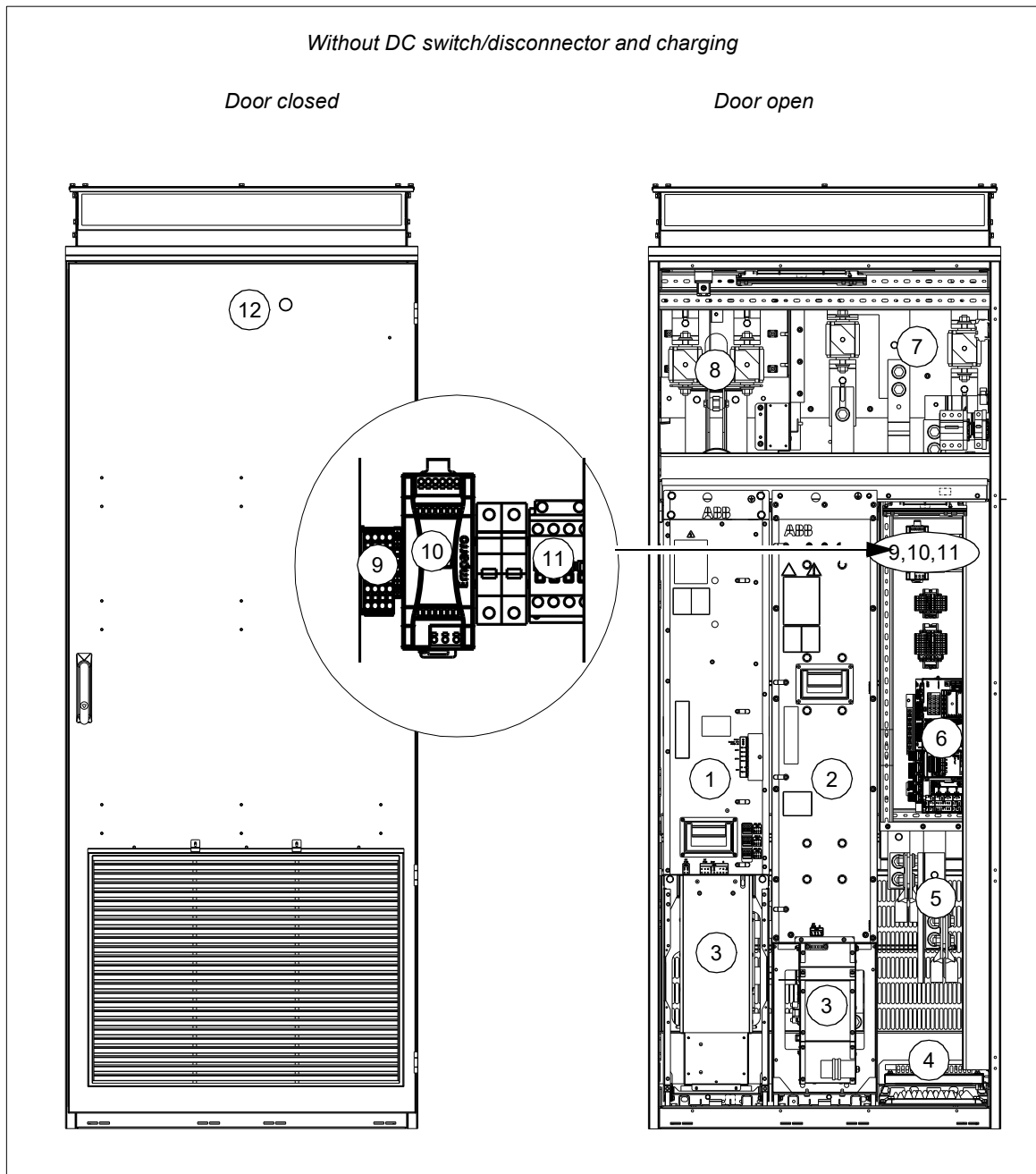
The figures show the components of the converter unit cubicle with the door closed, and with the door open and shrouds removed. In this figure, the DC/DC converter unit cubicle has the DC switch/disconnector and charging circuit.



	Designation	Description
1.	T11.1	R8i DC/DC converter module
2.	R13.1	Filter module
3.	-	Module cooling fans
4.	-	Cable entries for energy storage cables
5.	ES+, ES-	Energy storage connection
6.	A41	Control unit
7.	F13.xx	Output DC fuses
8.	F11.xx	DC fuses (DC bus side)
9.	A11.1	Charging controller; charging resistors [R1.x ... R4.x] are behind the charging controller
10.	-	Charging switch [Q10.1] shaft
11.	X33.1	Connection from the energy storage disconnecting device to the load disconnected indicator [P13.x]
12.	T22.1	24 V DC power supply
13.	Q26.1	Contact for filter fan control
14.		Control panel
15.	P11.1... P13.1	Door lights: Charging OK ([P11.x], green), DC/DC converter disconnected ([P12.x], white), Load disconnected ([P13.x], white). For more information, see DC/DC converter control devices on page 25.
16.	Q11.1	DC switch/disconnector (option +F286) handle
17.	-	Charging switch handle.

20 Operation principle and hardware description

The figure shows a converter unit cubicle without the DC switch/disconnector (option +F286) and charging circuit.

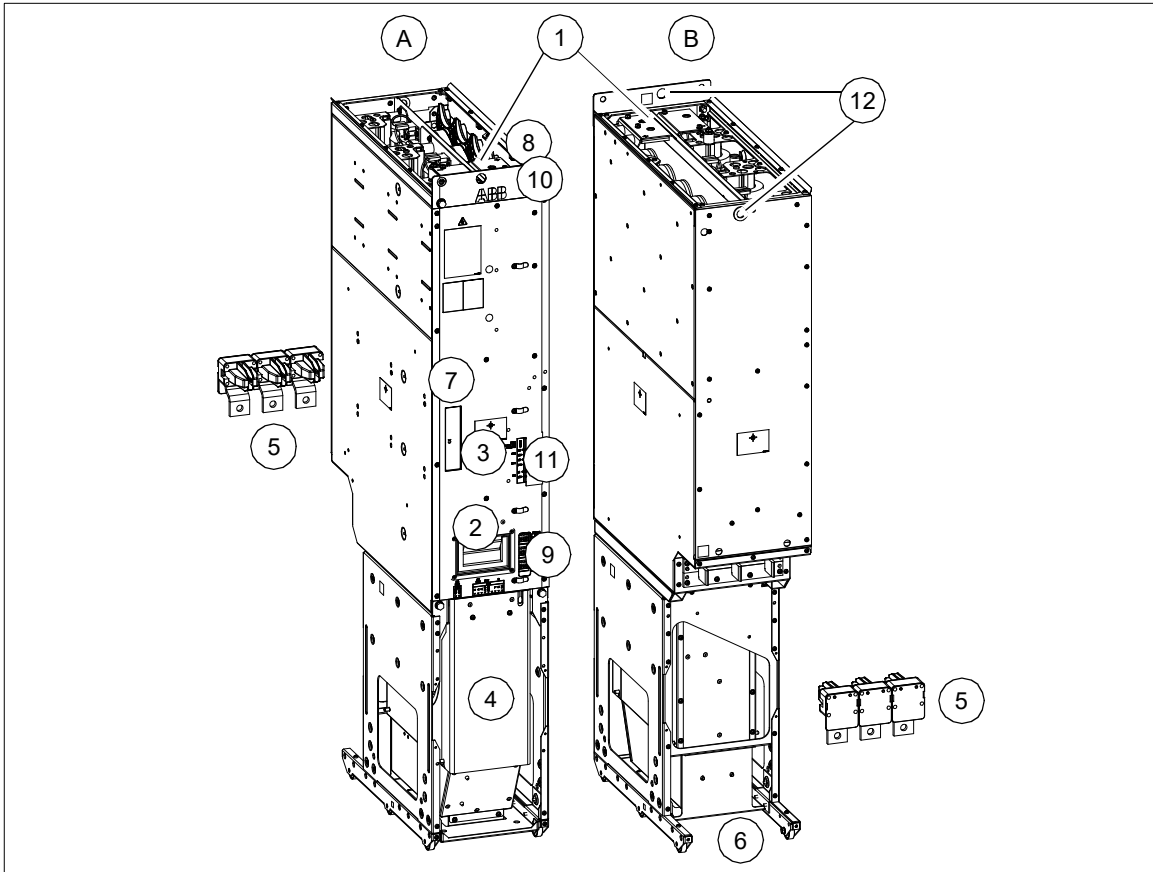


	Design.	Description
1.	T11.1	R8i DC/DC converter module
2.	R13.1	Filter module
3.	-	Module cooling fans
4.	-	Cable entries for energy storage cables
5.	ES+, ES-	Energy storage connection
6.	A41	Control unit

	Design.	Description
7.	F13.xx	Output DC fuses
8.	F11.xx	DC fuses (DC-bus-side)
9.	X33.1	Connection from the energy storage disconnecting device to the load disconnected indicator [P13.x]
10.	T22.1	24 V DC power supply
11.	Q26.1	Contact for filter fan control
12.	P13.1	Door light: Load disconnected ([P13.x], white). For more information, see DC/DC converter control devices on page 25.

R8i DC/DC converter module

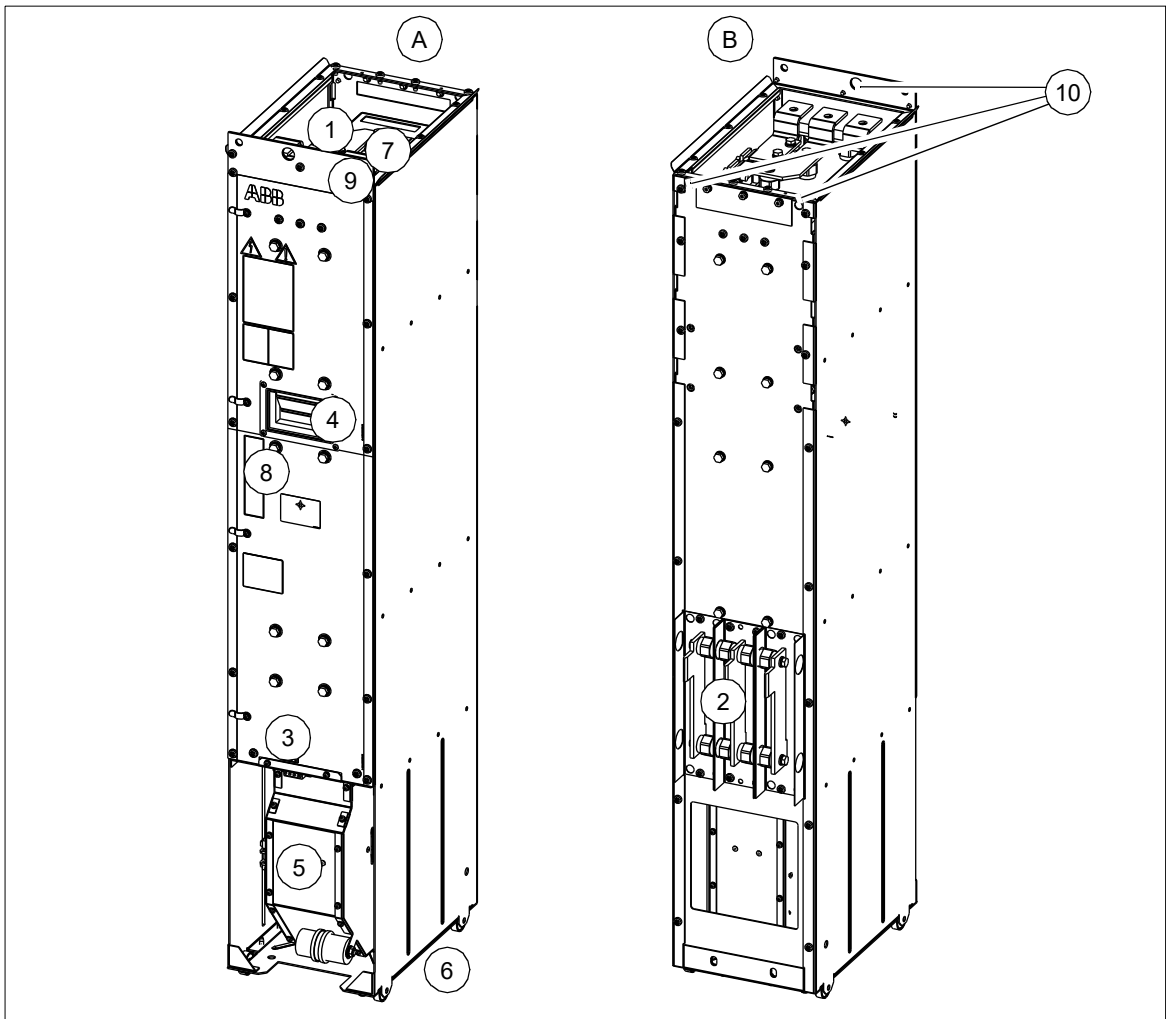
The converter modules run on wheels, which, along with the quick connector, enable quick extraction of a module for maintenance or replacement. The figure shows the layout of the converter module.



	Description
A	DC/DC converter module, frame size R8i, front
B	DC/DC converter module, frame size R8i, back
1.	Common DC bus connection
2.	Handle
3.	Fiber optic connectors of the module (wired to the control unit)
4.	Fan
5.	Quick connector (BDCL connection) (The counterpart fastened to the cabinet behind the module.)
6.	Wheels
7.	Type designation label of the module
8.	Terminal block [X50] (power supply for internal boards and module heating element, option +C183; DOL fan supply, option +C188)
9.	Connector [X53]. For more information on the connectors, see chapter Control unit .
10.	The unpainted grounding point (PE) between module frame and cabinet frame
11.	Circuit board compartment fan
12.	Lifting eyes.

■ BDCL filter module

The BDCL modules run on wheels, which enable quick extraction of a module for maintenance or replacement.

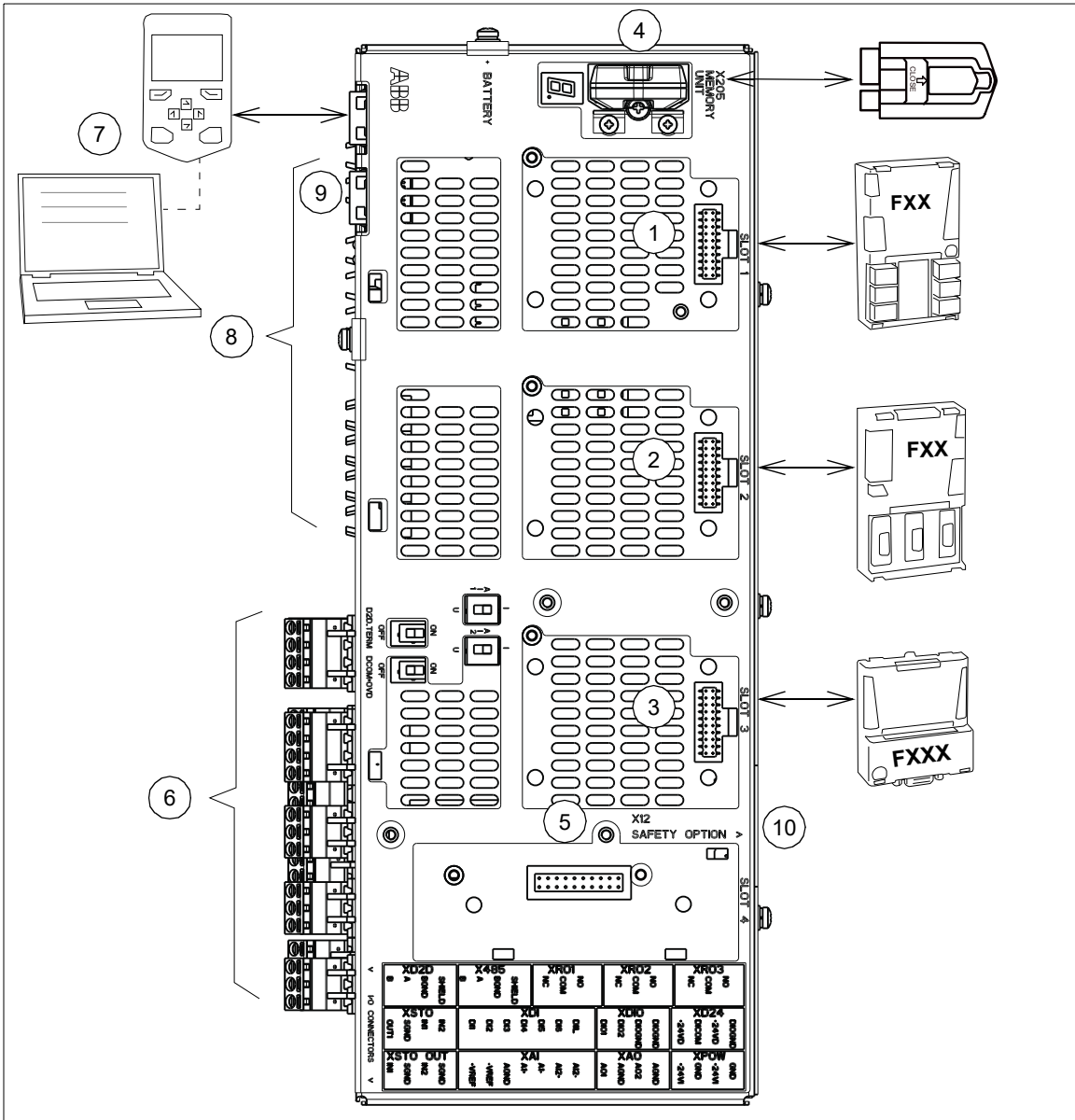


	Description
A	Filter module, front
B	Filter module, back
1.	Energy storage connection
2.	Converter module connection
3.	Terminal block [X55] (DOL fan supply, option +C188) (ready-connected)
4.	Handle
5.	Fan
6.	Wheels
7.	Terminal block [X30] (module DOL fan supply, option +C188)
8.	Type designation label of the module
9.	The unpainted grounding point
10.	Lifting eyes.

Overview of the control connections on the BCU control unit

Each converter unit is controlled by a control unit. The control unit is connected by fiber optic cables to each converter module. For details, see chapter [Control unit](#).

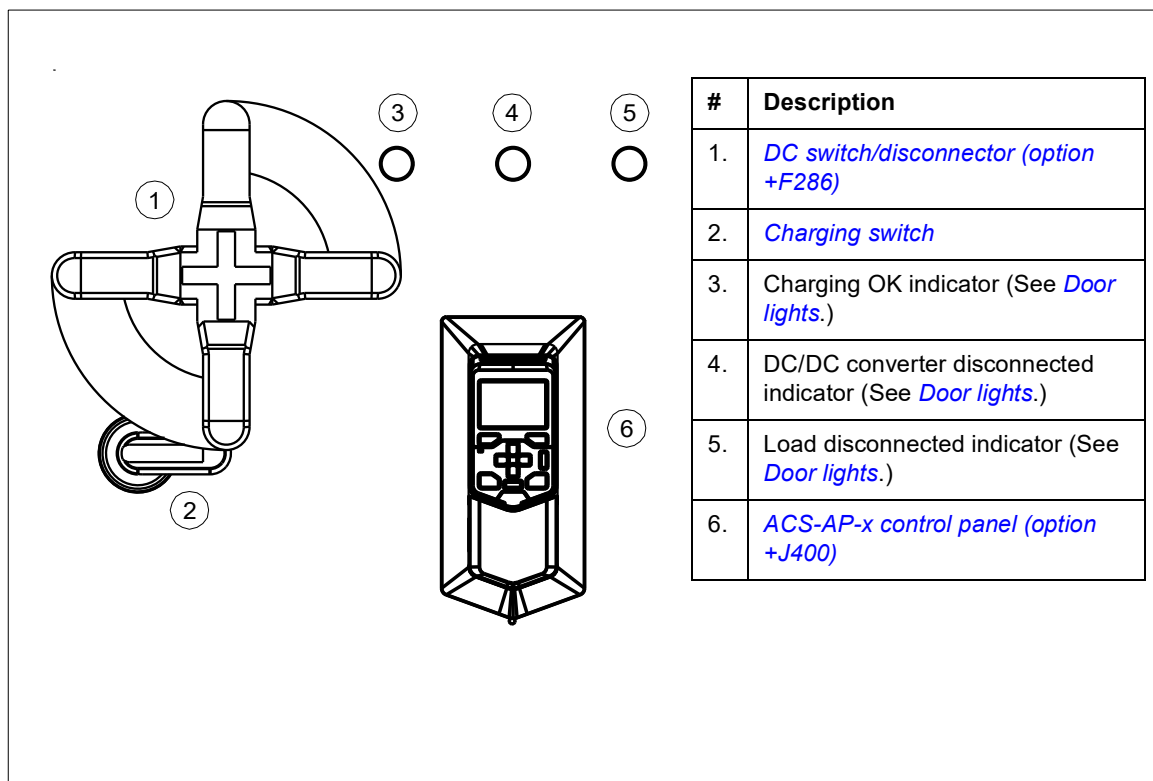
The diagram shows the control connections and interfaces of the BCU control unit.



No.	Description	No.	Description
1	2	3	Analog and digital I/O extension modules and fieldbus communication modules can be inserted into slots 1, 2 and 3.
4	Memory unit	7	Control panel or PC
5	Slot 4 for RDCO-0x	8	Fiber optic links to the converter modules
6	Terminal blocks. See chapter Control unit on page 53.	9	Ethernet interface
		10	Not in use in DC/DC converters.

DC/DC converter control devices

The figure shows an example of the door control devices of the DC/DC converter. The selection and exact location of control devices varies in different deliveries.



■ DC switch/disconnector (option +F286)

The DC switch/disconnector [Q11.xx] is optional (option +F286). The DC switch/disconnector has an operating handle on the cabinet door. A converter unit with a DC switch/disconnector also has a precharge circuit including a charging switch on the door.

The DC switch/disconnector allows the isolation of the unit from the DC bus. Before the unit is reconnected to the DC bus, the capacitors of the converter modules must be charged through a charging circuit.



WARNING! You must also switch off the charging switch to disconnect the DC/DC converter from the DC supply. Do not operate the DC switch/disconnector under load.

■ Charging switch

A converter unit with a DC switch/disconnector ([Q11], option +F286) also has charging circuit and a charging switch [Q10.x] on the cubicle door. Before closing the DC switch/disconnector, close the charging switch. After the precharging completes, the Charging OK indicator [P11.x] (green) on the cabinet door illuminates, and you can close the DC switch/disconnector [Q11.xx], and open the charging switch.

Note: You must open the charging switch before you can start the converter unit.



WARNING! You must also switch off the charging switch to disconnect the DC/DC converter from the DC supply.

■ Door lights

The load disconnected indicator ([P13.x], white) is always installed on the cabinet door. This indicator shows the state of the energy storage disconnecting device.

The Charging OK indicator ([P11.x], green) and DC/DC converter disconnected indicator ([P12.x], white) are installed when the DC switch/disconnector (option +F286) is selected.

The customer must connect the load disconnected indicator to the energy storage disconnecting device. For more information on the disconnecting devices, see [Energy storage disconnecting device](#) on page 37.

When the white lamps are on, the DC/DC converter is disconnected from both the DC bus and the energy storage.

■ ACS-AP-x control panel (option +J400)

One control panel is required for the commissioning of an ACS880 drive system, even if the Drive composer PC tool is used. With the control panel, you can:

- start and stop the converter unit
- view and reset the fault and warning messages, and view the fault history
- view actual signals
- change parameter settings
- change between local and external control.

The control panel can be mounted on the cabinet door using a DPMP-01 mounting platform (available separately).

For the instructions on the use of the panel, see *ACX-AP-x assistant control panels user's manual* (3AUA0000085685 [English]). For the parameter settings and control modes, see *ACS880 DC/DC converter control program firmware manual* (3AXD50000024671 [English]).

■ PC connection

There is a USB connector on the front of the panel that can be used to connect a PC to the drive. When a PC is connected to the control panel, the control panel keypad is disabled. See also section [Installing optional modules](#) on page 51.

■ Fieldbus control

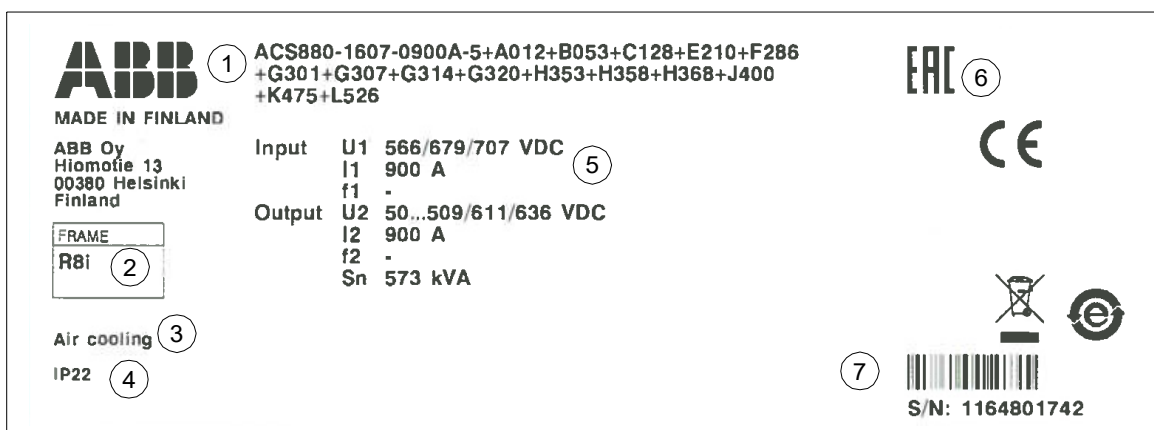
You can control the converter unit through a fieldbus interface if the unit is equipped with an optional fieldbus adapter (for example, option +K454), and when you have configured the control program for the fieldbus control with the parameters. For more information, see *ACS880 DC/DC converter control program firmware manual* (3AXD50000024671 [English]).

Type designation labels

■ Type designation label of the DC/DC converter unit

Each converter unit has a type designation label attached onto the inside of the cubicle door. The type designation label includes the ratings, appropriate markings, a type designation and a serial number of the unit.

An example label is shown below.


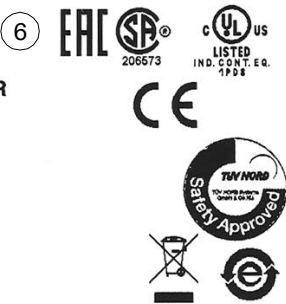





No.	Description
1.	Type designation. See section <i>Type designation key of the converter unit</i> on page 30.
2.	Frame size
3.	Cooling system and other additional data
4.	Degree of protection
5.	Ratings. See also section <i>Ratings</i> on page 103, <i>Input power (DC bus) connection</i> on page 112 and <i>Output power (energy storage) connection</i> on page 112.
6.	Valid markings. See <i>Electrical planning instructions for ACS880 multidrive cabinets and modules</i> (3AUA0000102324 [English]).
7.	Serial number. The first digit of the serial number refers to the manufacturing plant. The next four digits refer to the unit's manufacturing year and week, respectively. The remaining digits complete the serial number so that there are no two units with the same number.

■ Type designation labels of the DC/DC converter module

Each converter module also has type designation labels attached to it. The type designation stated on the labels contains information on the specifications and configuration of the module.

Example labels are shown below.

		1 ACS880-104-0640A-3+E205		6 	
MADE IN FINLAND ABB Oy Hiomotie 13 00380 Helsinki Finland		5		LINE CONVERTER 3~ 400 VAC 576 A 50/60 Hz 566 VDC 698 A - 399 kVA	
Input U1 566 VDC I1 720 A f1 -		INVERTER Output U2 3~ 0...400 VAC I2 640 A f2 0...500 Hz Sn 443 kVA			
FRAME R8i 2					
Air cooling IP00 3 UL open type 4				7  S/N: 1183300407	

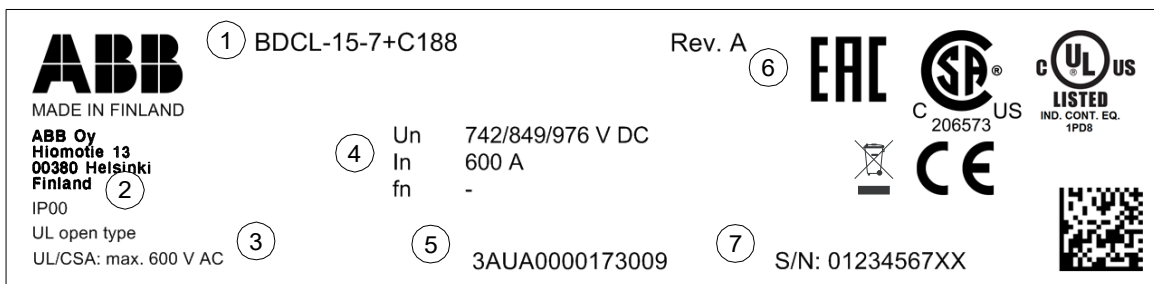
		1 ACS880-104-0690A-7+E205		 S/N: 1145200001	
Input U1 742/849/976 V DC I1 1171 A f1 -		5		DC/DC CONVERTER 742/849/976 V DC 600 A - 50...668/764/878 V DC 600 A - 527 kVA	
Output U2 3x 0...742/849/976 V DC I2 3x 485 A f2 - Sn 1300 kVA		BRAKE CHOPPER 742/849/976 V DC 1171 A - 3x 0...742/849/976 V DC 3x 485 A - 1300 kVA		REGENERATIVE RECTIFIER 3~ 525/600/690 V AC 900 A - 50/60 Hz 709/810/932 V DC 1091 A - 1076 kVA	

No.	Description
1.	Type designation. See section Type designation labels of the DC/DC converter module on page 28.
2.	Frame size
3.	Degree of protection
4.	UL/CSA data. See section Input power (DC bus) connection on page 112.
5.	Ratings. See also section Ratings on page 103, Input power (DC bus) connection on page 112 and Output power (energy storage) connection on page 112.
6.	Valid markings. See Electrical planning instructions for ACS880 multidrive cabinets and modules (3AUA0000102324 [English]) .
7.	Serial number. The first digit of the serial number refers to the manufacturing plant. The next four digits refer to the unit's manufacturing year and week, respectively. The remaining digits complete the serial number so that there are no two units with the same number.

■ Type designation label of the BDCL filter module

Each BDCL filter module has a type designation label attached to it.

An example label is shown below.



No.	Description
1.	Type designation. See Type designation key of the filter module on page 32.
2.	Degree of protection
3.	UL/CSA data
4.	Ratings
5.	Code of the filter
6.	Valid markings. See <i>Electrical planning instructions for ACS880 multidrive cabinets and modules</i> (3AUA0000102324 [English]).
7.	Serial number. The first digit of the serial number refers to the manufacturing plant. The next four digits refer to the unit's manufacturing year and week, respectively. The remaining digits complete the serial number so that there are no two units with the same number.

Type designation keys

Type designation key of the converter unit

Type designation describes the composition of the unit in short. The type designation is visible on the label (sticker) which is attached to the cabinet. The complete designation code is divided in subcodes:

- The first 1...18 digits form the basic code. It describes the basic construction of the unit. The fields in the basic code are separated by hyphens.
- The option codes follow the basic code. Each option code starts with an identifying letter (common for the whole product series), followed by descriptive digits. The option codes are separated by plus signs.

CODE	DESCRIPTION
Basic codes	
ACS880	Product series
1607	Construction: cabinet-installed DC/DC converter unit. When no options are selected: Supply frequency 50 Hz, control voltage 230 V AC, IP22 (UL type 1), EN/IEC industrial cabinet construction, power and control cabling through the bottom of the cabinet, DC busbar material aluminum, cable supply conductors, standard wiring material, speed-controlled fan, ACS880 DC/DC converter control program, complete documentation in English in memory stick.
Size	
0900A	Refer to the rating tables on page 103 .
Voltage range	
3	DC voltage corresponding AC input voltages 3 ~ 380...415 V. This is indicated in the type designation label as typical input voltage level 566 V DC.
5	DC voltage corresponding AC input voltages 3 ~ 380...500 V. This is indicated in the type designation label as typical input voltage levels 566 / 679 / 707 V DC.
7	DC voltage corresponding AC input voltages 3 ~ 525...690 V. This is indicated in the type designation label as typical input voltage levels 742 / 849 / 976 (849 UL/CSA) V DC.

This is a list of options codes. The standard features are marked with *.

Code	Description	
+A012	Supply frequency	Supply frequency 50 Hz *
+A013	Supply frequency	Supply frequency 60 Hz
+B053	Degree of protection	IP22, UL type 1 *
+B054	Degree of protection	IP42, UL type 1
+B055	Degree of protection	IP54, UL type 12
+C121	Cabinet construction	Marine construction
+C128	Channeled air	Cooling air through bottom
+C129	Standards	UL-approved
+C130	Channeled air outlet	Channeled air outlet
+C132	Marine type approval	Marine type-approved DC/DC converter unit
+C134	Standards	CSA-approved
+C164	Cabinet options	Plinth height 1 (100 mm)
+C180	Cabinet construction	Seismic design
+C188	DOL cooling fan	DOL cooling fan
+E210	EMC	2nd environment
+F286	DC switch/disconnector	DC switch/disconnector
+G300	Cabinet options	Cabinet heater
+G301	Cabinet options	Cabinet lighting
+G304	Auxiliary voltage distribution	115 V AC

Code	Description		
+G315	DC bus material	Tin plated copper (UL)	
+G320	Auxiliary voltage distribution	230 V AC	*
+G330	Wiring materials	Halogen free wiring	
+G442	Voltage/current measurement unit	BAMU voltage/current measurement unit	
+H352	Power cabling exit	Bottom exit	*
+H353	Power cabling exit	Top exit	
+H358	Cable gland	Cable gland plates (Steel 3mm, undrilled)	
+H364	Cable gland	Cable gland plates (Aluminium 3mm, undrilled)	
+H365	Cable gland	Cable gland plates (Brass 6mm, undrilled)	
+H367	Control cabling	Control cable bottom	*
+H368	Control cabling	Control cable top	
+J400	Control panel	Control panel	
+J410	Panels	Drive control panel connection kit	
+J412	Panels	Common control panel for a line-up	
+K450	Panels	Panel bus	
+K451	FieldBus1	FDNA-01 (DeviceNet)	
+K452	FieldBus1	FLON-01 (LonWorks)	
+K454	FieldBus1	FPBA-01 (PROFIBUS DP, DPV0/DPV1)	
+K457	FieldBus1	FCAN-01 (CANopen)	
+K458	FieldBus1	FSCA-01 (Modbus RTU)	
+K462	FieldBus1	FCNA-01 (ControlNet)	
+K469	FieldBus1	FECA-01 (EtherCAT)	
+K470	FieldBus1	FEPL-02 (Ether POWERLINK)	
+K473	FieldBus1	FENA-011 (EtherNet/IP, Modbus/TCP, PROFINET)	
+K475	FieldBus1	FENA-21 (EtherNet/IP, Modbus/TCP, PROFINET IO) Daisy chain	
+K480	Ethernet switch	Ethernet switch for PC tool and control network	
+K483	Ethernet switch	Ethernet switch with optical link for PC tool or control network	
+L500	I/O options 2	FIO-11 Analog I/O extension	
+L501	I/O options 1	FIO-01 Digital I/O extension	
+L509	DDCS	RDCO-04 DDCS communication	
+L525	I/O options3	FAIO-01 Analog I/O extension 2	
+L526	I/O options4	FDIO-01 Digital I/O extension 2	
+R700	Language	English	*
+R701	Language	German manuals	
+R702	Language	Italian manuals	
+R705	Language	Swedish manuals	
+R706	Language	Finnish manuals	
+R707	Language	French manuals	
+R708	Language	Spanish manuals	
+R711	Language	Russian manuals	
+R716	Documentation	User's manuals paper copy, one set	

■ Type designation key of the converter module

The type designation describes the composition of the module in short. The type designation is visible on the label (sticker) which is attached to the module. The complete designation code is divided in subcodes:

- The first 1...18 digits form the basic code. It describes the basic construction of the unit. The fields in the basic code are separated by hyphens.
- The plus codes follow the basic code. Each plus code starts with an identifying letter (common for the whole product series), followed by descriptive digits. The plus codes are separated by plus signs.

The following table lists the basic code and plus codes of the converter module.

CODE	DESCRIPTION
Basic codes	
ACS880	Product series
104	Construction: DC/DC converter module. The module delivery includes a speed-controlled cooling fan as standard.
Size	
600A	Refer to the rating tables on page 103 .
Voltage range	
3	DC voltage corresponding AC input voltages 3 ~ 380...415 V. This is indicated in the type designation label as typical input voltage level 566 V DC.
5	DC voltage corresponding AC input voltages 3 ~ 380...500 V. This is indicated in the type designation label as typical input voltage levels 566 / 679 / 707 V DC.
7	DC voltage corresponding AC input voltages 3 ~ 525...690 V. This is indicated in the type designation label as typical input voltage levels 742 / 849 / 976 V DC (849 V DC for UL/CSA).
Plus codes	
+C132	Marine type-approved DC/DC converter module
+C183	Internal heating element
+C188	Direct-on-line (DOL) cooling fan
+E205	Internal du/dt filters (When the module is used as a DC/DC converter, it must always be ordered with +E205.)
+G304	115 V auxiliary voltage supply

■ Type designation key of the filter module

The designation code of the BDCL filter is divided in subcodes:

- The first 4 letters and two numbers give the type of the filter, for example, **BDCL-15-7**.
- The plus codes follow the basic code. Each plus code starts with an identifying letter (common for the whole product series), followed by descriptive digits. The plus codes are separated by plus signs.

CODE	DESCRIPTION
Basic codes	
BDCL-1x	BDCL filter
Voltage range	
5	DC voltage corresponding AC input voltages 3 ~ 380...500 V AC. This is indicated in the type designation label as typical input voltage levels 566 / 679 / 707 V DC
7	DC voltage corresponding AC input voltages 3 ~ 525...690 V. This is indicated in the type designation label as typical input voltage levels 742 / 849 / 976 V DC
Plus codes	
+C188	Direct-on-line (DOL) cooling fan (included in the delivery as standard)
+G304	115 V auxiliary voltage supply

3

Mechanical installation



Contents of this chapter

This chapter describes the mechanical installation of the converter units.

DC/DC converter units

For checking the installation site, moving the unit and installing cabinets, see *Mechanical installation instructions for ACS880 multidrive cabinets* (3AUA0000101764 [English]).

Energy storage

Obey the energy storage manufacturer's instructions.





4

Guidelines for planning electrical installation

Contents of this chapter

This chapter contains instructions on selecting, placing and protecting the DC/DC converter circuit components and cables.

Limitation of liability

The installation must always be designed and made according to applicable local laws and regulations. ABB does not assume any liability whatsoever for any installation which breaches the local laws and/or other regulations. Furthermore, if the recommendations given by ABB are not followed, the drive may experience problems that the warranty does not cover.

Generic guidelines

See *Electrical planning instructions for ACS880 multidrive cabinets and modules* (3AUA0000102324 [English]) for the generic guidelines for planning the electrical installation (selecting cables, routing cables, etc.) of the air-cooled multidrive cabinets.

Selecting the energy storage



WARNING! ABB is not responsible for the customer 's energy storage selection or protection of the energy storage.

The energy storage does not belong to the converter unit delivery. The customer (or the system integrator) must equip the DC/DC converter with a suitable energy storage system. The customer (or the system integrator) must also connect parallel modules (if any) to the same energy storage. Additional guidelines:

- Dimension the energy storage so that it withstands the required current cycles and the stored energy is sufficient. Take the depth of discharge into account in energy storage lifetime calculations.
- Make sure that the energy storage withstands the current ripple of the converter. See [Ratings](#) on page 103.
- The output voltage (energy storage voltage) is not allowed to exceed the DC/DC converter DC bus voltage. Add sufficient voltage margin in the design to prevent this in case of voltage dips or grid faults.

- The recommended energy storage operating voltage is:

$$U_{\text{storage}} = 150 \text{ V} \dots 80\% \text{ of } U_{\text{DC}}$$

- Typical DC voltage values:

- with diode supply units (ACS880-307 +A003, ACS880-307 +A018):

$$U_{\text{DC}} = 1.35 \times U_{\text{AC}}$$

- with IGBT supply units (ACS880-207):

$$U_{\text{DC}} = 1.41 \times U_{\text{AC}} \quad (\text{can be changed with supply unit parameter group 123 DC volt ref})$$

- with regenerative rectifier units (ACS880-907):

$$U_{\text{DC}} = 1.35 \times U_{\text{AC}}$$

- where

$$U_{\text{DC}} = \quad \text{Drive DC voltage (in the DC bus)}$$

$$U_{\text{AC}} = \quad \text{Drive input voltage (AC)}$$

- We recommend to measure the energy storage voltage. If the energy storage is a super capacitor, voltage measurement is obligatory unless the capacitor withstands the maximum DC voltage of the drive or contains internal overvoltage protection. If the converter is equipped with the BAMU voltage/current measurement unit (option +G442), the converter measures its output voltage (and thus also the ES voltage) automatically.

If there is no BAMU, you must arrange the voltage measurement separately, and send the measured value to the converter control program, eg, via a fieldbus communication (if in use), or by some other means.

For more information, see section *Energy storage voltage measurement and estimation* and parameter description in *ACS880 DC/DC converter control program firmware manual* (3AXD50000024671 [English]).

- Equip the energy storage with a circuit breaker capable of opening the circuit if there is a failure in the energy storage or cable. See [Selecting the protective circuit breaker of the energy storage](#) below and [Energy storage disconnecting device](#) on page 37.

Implementing protections

■ General principles

The requirements for the customer-defined protections at the energy storage end:

- disconnecting device between drive and energy storage system (for example, isolation disconnect switch, withdrawable circuit breaker)
- proper overload and short circuit protection for the cabling (for example, circuit breaker with thermal or electromagnetic trip unit)
- proper overload and short circuit protection for energy storage elements itself (for example, integrated overload protection in batteries).

■ Selecting the protective circuit breaker of the energy storage



WARNING! ABB is not responsible for the energy storage selection or protection of the energy storage.

The customer (or the system integrator) must equip the energy storage with a protective circuit breaker. The breaker must be able to switch load current on and off. The breaker must also provide the overload and short-circuit protection for the energy storage. If there is no other protection devices for cables at the energy storage end, the breaker must also provide the overload and short-circuit protection for the cable(s).

The protective circuit breaker does not belong to the converter unit delivery.

The customer (or the system integrator) must verify the operation of the circuit breaker by short circuit calculations taking into account impedances of the converter, filter, cabling and energy storage, and minimum and maximum state of charge of the energy storage. The customer (or the system integrator) must take into account the impact of ageing to storage impedances.

See [Filter module data](#) on page 108.

■ Energy storage disconnecting device

The customer (or the system integrator) must equip the energy storage with a disconnecting device for service purposes. Connect the load disconnected indicator [P13.x] to the disconnecting device. See [Connecting the energy storage cable and load disconnected indicator cable](#) on page 48.

The disconnecting device does not belong to the converter unit delivery.

■ Overload protection of the system by the DC/DC converter

There is a thermal protection function in the DC/DC converter control program. For more information, see the firmware manual.

■ Protecting the energy storage cable

ABB equips the DC/DC converter unit with DC fuses as standard. The fuses protect the DC/DC converter and cables in a cable short-circuit situation.

The customer (or the system integrator) must equip the energy storage with overload and short circuit protection for the cable.

Energy storage discharging device

When necessary, the customer (or the system integrator) must equip the energy storage with a discharging device. If the energy storage is a super capacitor, we recommend to have it.

Implementing an interlocking between the disconnecting devices

The customer (or the system integrator) must implement an interlocking circuit between DC switch/disconnector of the DC/DC converter unit and the energy storage disconnector. The user must not be able to close the energy storage disconnector before closing the DC switch/disconnector ([Q11.xx], option +F286) of the DC/DC converter.

Selecting and routing the energy storage cables

■ Recommended cables

The customer (or the system integrator) must acquire and connect the energy storage cables. It is possible to use either 3-conductor shielded cable(s) or 4-conductor shielded cables:

- If you use a 4-conductor shielded cable, use 2 conductors for plus and 2 conductors for minus and the shield for PE.
- If you use a 3-conductor shielded cable, use 1 conductor for plus, 1 conductor for minus and 1 conductor and the shield for PE.

■ Typical cable sizes

This table gives copper cable types. Cable sizing is based on max. 9 cables laid on a cable ladder side by side, three ladder type trays one on top of the other, ambient temperature 30 °C, PVC insulation, surface temperature 70 °C and 90 °C (EN 60204-1 and IEC 60364-5-2/2001). For other conditions, the customer (or the system integrator) must select the cables according to local safety regulations, appropriate input voltage and the load current of the drive. $I_{rms\ dim}$ is the dimensioning current.

DC/DC converter unit type	Frame size	$I_{rms\ dim}$ A	Cable data			
			3-conductor cable		4-conductor cable	
			PVC, T=70 °C, copper cable	XLPE, T=90 °C, copper cable	PVC, T=70 °C, copper cable	XLPE, T=90 °C, copper cable
			mm ²	mm ²	mm ²	mm ²
$U_N = 400\ V$						
ACS880-1607-0600A-3	R8i	720	3×(3×185+95)	2×(3×240+120)	2×(4×120+70)	1×(4×240+120)
ACS880-1607-0900A-3	R8i	1080	4×(3×240+120)	4×(3×150+70)	2×(4×240+120)	2×(4×185+95)
ACS880-1607-1200A-3	2×R8i	1440	2×(3×(3×185+95))	2×(2×(3×240+120))	4×(4×120+70)	2×(4×240+120)
ACS880-1607-1800A-3	2×R8i	2160	2×(4×(3×240+120))	2×(4×(3×150+70))	4×(4×240+120)	4×(4×185+95)
$U_N = 500\ V$						
ACS880-1607-0600A-5	R8i	720	3×(3×185+95)	2×(3×240+120)	2×(4×120+70)	1×(4×240+120)

DC/DC converter unit type	Frame size	I_{rms} dim A	Cable data			
			3-conductor cable		4-conductor cable	
			PVC, T=70 °C, copper cable	XLPE, T=90 °C, copper cable	PVC, T=70 °C, copper cable	XLPE, T=90 °C, copper cable
			mm ²	mm ²	mm ²	mm ²
ACS880-1607-0900A-5	R8i	1080	4×(3×240+120)	4×(3×150+70)	2×(4×240+120)	2×(4×185+95)
ACS880-1607-1200A-5	2×R8i	1440	2×(3×(3×185+95))	2×(2×(3×240+120))	4×(4×120+70)	2×(4×240+120)
ACS880-1607-1800A-5	2×R8i	2160	2×(4×(3×240+120))	2×(3×(3×240+120))	4×(4×240+120)	4×(4×185+95)
$U_N = 690$ V						
ACS880-1607-0400A-7	R8i	480	2×(3×185+95)	2×(3×150+70)	1×(4×185+95)	1×(4×150+70)
ACS880-1607-0600A-7	R8i	720	3×(3×185+95)	2×(3×240+120)	2×(4×120+70)	1×(4×240+120)
ACS880-1607-0800A-7	2×R8i	960	4×(3×240+120))	4×(3×150+70)	2×(4×185+95)	2×(4×150+70)
ACS880-1607-1200A-7	2×R8i	1440	2×(3×(3×185+95))	2×(2×(3×240+120))	4×(4×120+70)	2×(4×240+120)

3AXD00000601909

■ Minimizing electromagnetic interference

The customer (or the system integrator) must obey these rules in order to minimize the electromagnetic interference caused by rapid current changes in the energy storage cables:

- Shield the energy storage cabling completely, either by using shielded cable or a metallic enclosure. Unshielded single-core cable can only be used if it is routed inside a cabinet that efficiently suppresses radiated emissions.
- Install the cables away from other cable routes.
- Avoid long parallel runs with other cables. The minimum parallel cabling separation distance should be 0.3 meters.
- Cross other cables at right angles.

Keep the cable as short as possible in order to minimize the radiated emissions and stress on converter IGBT semiconductors. The longer the cable, the higher the radiated emissions, inductive load and voltage peaks over the IGBTs of the DC/DC converter.

■ Maximum cable length

The maximum cable length of the energy storage cable(s) is 100 m (328 ft).

■ EMC compliance of the complete installation

Note: ABB has not verified that the EMC requirements are fulfilled with external energy storage and its cabling. The EMC compliance of the complete installation must be considered by the customer (or the system integrator).

Parallel connection of the DC/DC converter units

It is possible to connect multiple DC/DC converter units in parallel. In the parallel connection, both the inputs and the outputs of the units must be connected together. The inputs are connected through the common DC bus of the multidrive as standard. The outputs (ES+ to ES+, ES- to ES-) must be connected together at the energy storage end by the customer (or the system integrator).

The customer (or the system integrator) must make sure that the load sharing is even between the parallel units. Depending on the case, this may require additional parameter tuning in DC/DC converter control programs of both units:

- If the operating mode selection (197.13) is *Power* or *Add*: The load between the units is inherently shared according to the power or current references. No additional settings are required.
- If the operating mode selection (197.13) is *DC voltage*: Tune the load sharing using the droop control function.
- Master/follower operation of the parallel units: The control program does not support the master/follower link between several units. However, it is possible to implement the Master/follower operation with an external PLC. In that case, one DC/DC converter unit, the master unit, operates in the DC voltage control mode and the other unit(s) in power control mode. The external PLC reads the output current reference of the master unit, and uses it as the current reference of the follower units.

The load sharing during an overvoltage or undervoltage control of the DC/DC converter can require tuning of the DC voltage offset value between the parallel units. See the firmware manual for details.

The customer (or the system integrator) must pay special attention to the protection concept in case of parallel units. The protection must operate reliably in all possible fault cases.

5

Electrical installation

Contents of this chapter

This chapter contains instructions on wiring the converter units.

Note: The instructions do not cover electrical installation of the energy storage media.

Safety



WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.



■ Electrical safety precautions



WARNING! Obey these instructions. If you ignore them, injury or death, or damage to the equipment can occur. If you are not a qualified electrician, do not do installation or maintenance work. Go through these steps before you begin any installation or maintenance work.

1. Keep the cabinet doors closed when the drive is powered. With the doors open, a risk of a potentially fatal electric shock, arc flash or high-energy arc blast exists.
2. Clearly identify the work location.
3. Disconnect all possible voltage sources. Lock and tag.
 - Open all energy storage disconnectors (customer-installed device).
 - Open the DC switch/disconnector ([Q11], option +F286) of each DC/DC converter. See [Disconnecting the DC/DC converter with DC switch/disconnector \(option +F286\)](#) on page 66.

Note: If you have a DC/DC converter unit with parallel-connected converter modules, and/or if you have parallel-connected energy storages (for example, multiple batteries connected in parallel), open the disconnectors of both the converter modules and all disconnectors of the energy storage modules.

 - Open the main switch/disconnector [Q1], or rack out the main breaker [Q1] of the drive (whichever is present).
 - Open the disconnector of the supply transformer as the main disconnecting device of the drive does not remove the voltage from the input busbars of the drive or from the voltmeter (option +G334), if present.
 - Make sure that reconnection is not possible. Lock the disconnectors to open position and attach a warning notice to them.
 - Disconnect any external power sources from the control circuits before you do work on the control cables.
 - After you disconnect the drive, always wait for 5 minutes to let the intermediate circuit capacitors discharge before you continue.
4. Protect any other energized parts in the work location against contact.
5. Take special precautions when close to bare conductors.
6. Measure that the installation is de-energized.
 - Use a multimeter with an impedance of at least 1 Mohm.
 - Make sure that the voltage between the drive input power terminals and the grounding (PE) busbar is close to 0 V.



WARNING! If the measurement requires removal or disassembly of shrouding or other cabinet structures, obey the local laws and regulations applicable to live working (including – but not limited to – electric shock and arc protection).

7. Install temporary grounding as required by the local regulations. Close the grounding switch ([Q9], option +F259), if present
8. Ask for a permit to work from the person in control of the electrical installation work.

General notes

■ Static electricity



WARNING! Circuit boards contain components sensitive to electrostatic discharge (ESD). Wear a grounding wrist band when handling the boards. Do not touch the boards unnecessarily.

■ Optical components

Handle fiber optic cables with care. When unplugging optic cables, always grab the connector, not the cable itself. Do not touch the ends of the fibers with bare hands as the fiber is extremely sensitive to dirt.

Checking the insulation of the energy storage cable



WARNING! Repeat the steps described in section [Electrical safety precautions](#) on page 42. Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.



WARNING! Open the DC switch/disconnector ([Q11], option +F286) of each DC/DC converter.

Do not make any voltage tolerance or insulation resistance tests on the converter modules. Every converter module has been tested for insulation between the main circuit and the chassis at the factory.

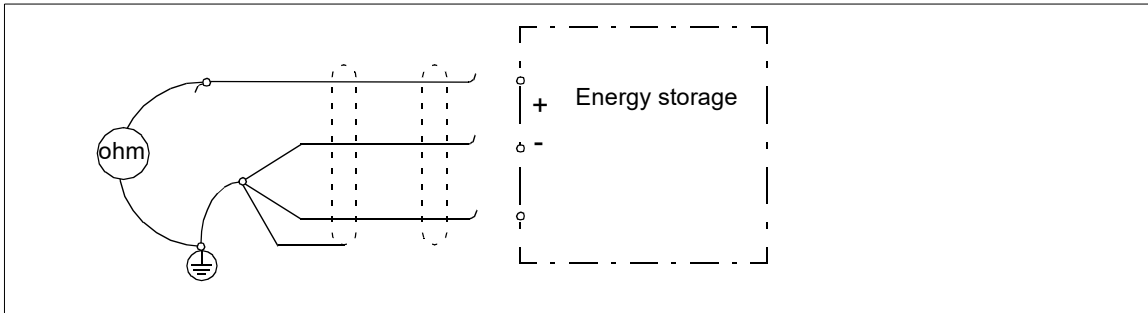
Check the insulation resistance of the energy storage as instructed by its manufacturer.

Check the energy storage cable as follows:



44 Electrical installation

1. Make sure that the cable is disconnected from the DC/DC converter and energy storage: all conductors and the shield.
2. At the converter unit end, connect all conductors and shield of the cable together and to the grounding terminal (PE).
3. Disconnect one conductor and measure the insulation resistance between the conductor and the PE by using a measuring voltage of 1 kV DC. The insulation resistance must be higher than 1 Mohm
4. Reconnect the conductor, disconnect another conductor and measure its insulation resistance. Repeat this for all remaining conductors (including the cable shield).



Connecting the control cables for the converter unit

■ Default I/O connection diagram

See chapter [Control unit](#).

■ Connection procedure of control cables



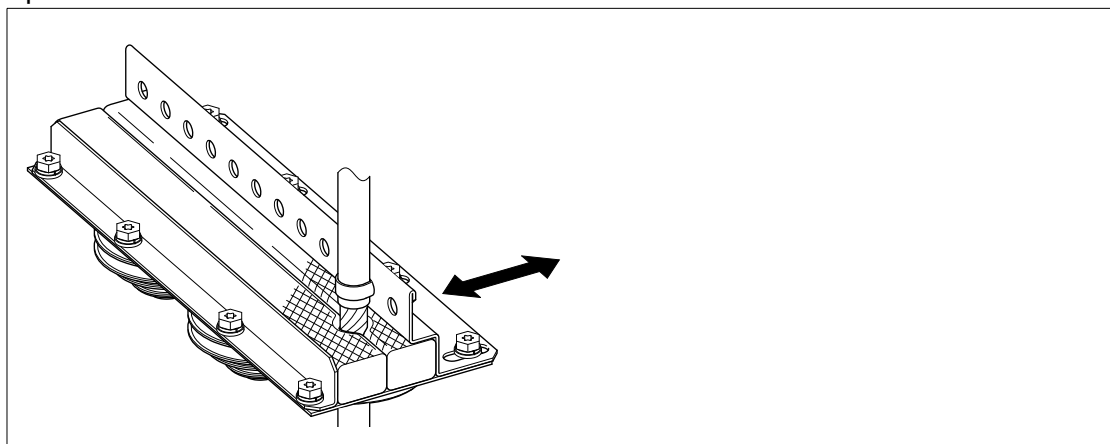
WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.

1. Repeat the steps described in section [Electrical safety precautions](#) on page 42.
2. Open the door of the DC/DC converter cubicle and remove the shrouding.
3. Run the control cables into the cubicle as described in section [Grounding the outer shields of the control cables at the cabinet cable entry](#) below.
4. Route the control cables to the control connection terminals. Use the existing trunking in the cabinet wherever possible. Use sleeving if cables are laid against sharp edges.
5. Connect the control cables. See chapter [Control unit](#) and the circuit diagrams delivered with the drive.
6. Refit any shrouds removed earlier and close the door of the cubicle.

Grounding the outer shields of the control cables at the cabinet cable entry

Ground the outer shields of all control cables 360 degrees at the EMI conductive cushions as follows:

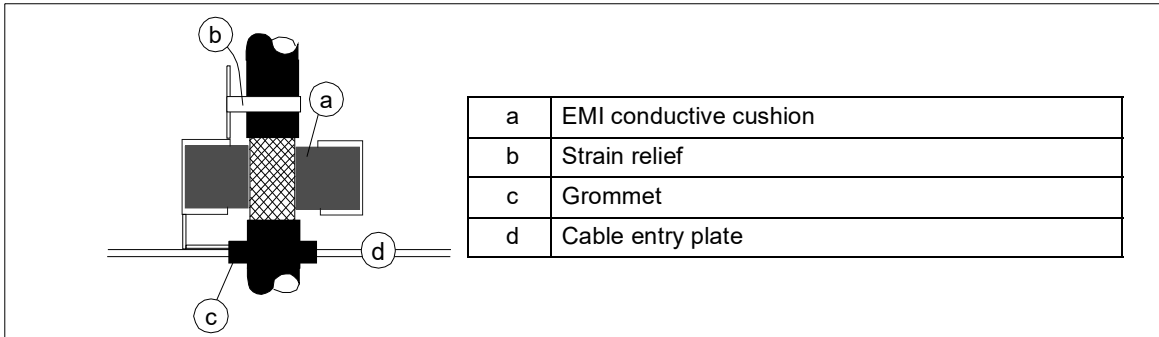
1. Slacken the tightening screws of the EMI conductive cushions and pull the cushions apart.



2. Cut adequate holes to the rubber grommets in the cable entry plate and lead the cables through the grommets and the cushions into the cabinet.
3. Strip off the cable plastic sheath above the cable entry plate just enough to make sure that the connection of the bare shield and the EMI conductive cushions is proper.

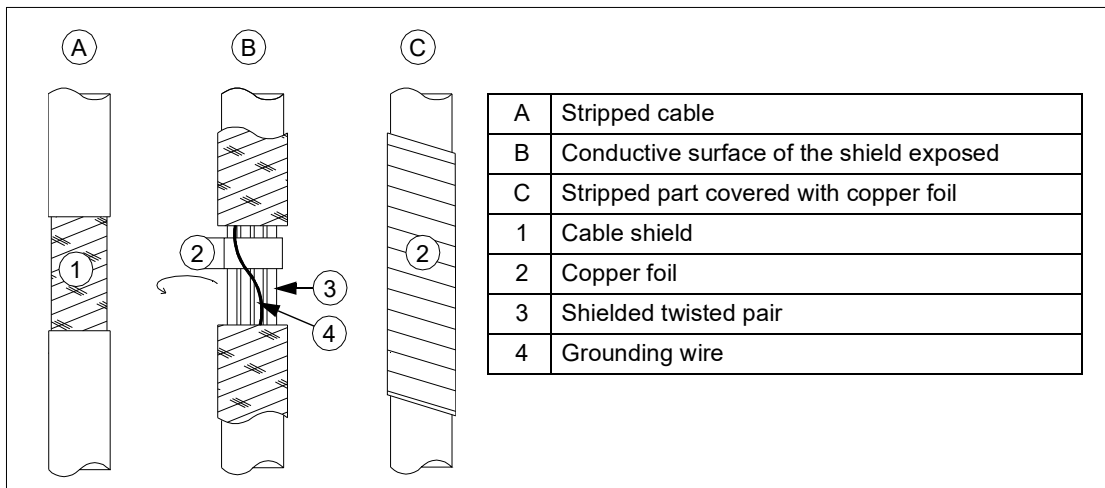


4. Tighten the two tightening screws so that the EMI conductive cushions press tightly round the bare shield.
5. Secure the cables mechanically at the cable entry strain relief.
6. Keep the shields continuous as close to the connection terminals as possible.



Note: If the outer surface of the shield is non-conductive:

- Cut the shield at the midpoint of the bare part. Be careful not to cut the conductors or the grounding wire (if present).
- Turn the shield inside out to expose its conductive surface.
- Cover the turned shield and the stripped cable with copper foil to keep the shielding continuous.

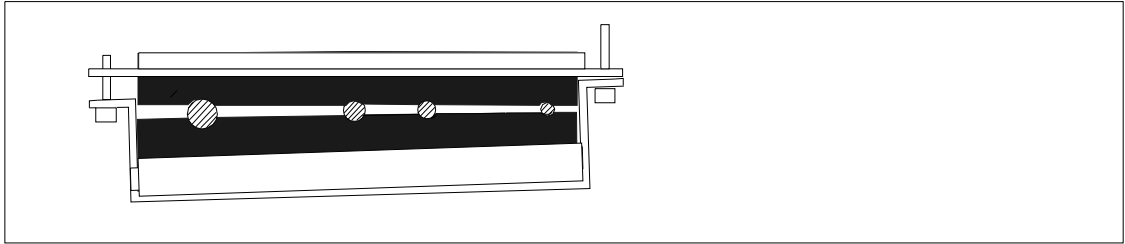


Note for top entry of cables: When each cable has its own rubber grommet, sufficient IP and EMC protection can be achieved. However, if very many control cables come to one cabinet, plan the installation beforehand as follows:

1. Make a list of the cables coming to the cabinet.
2. Sort the cables going to the left into one group and the cables going to the right into another group to avoid unnecessary crossing of cables inside the cabinet.
3. Sort the cables in each group according to size.
4. Group the cables for each grommet as follows ensuring that each cable has a proper contact to the cushions on both sides.

Cable diameter in mm	Max. number of cables per grommet
≤ 13	4
≤ 17	3
< 25	2
≥ 25	1

5. Arrange the bunches according to size from thickest to the thinnest between the EMI conductive cushions.



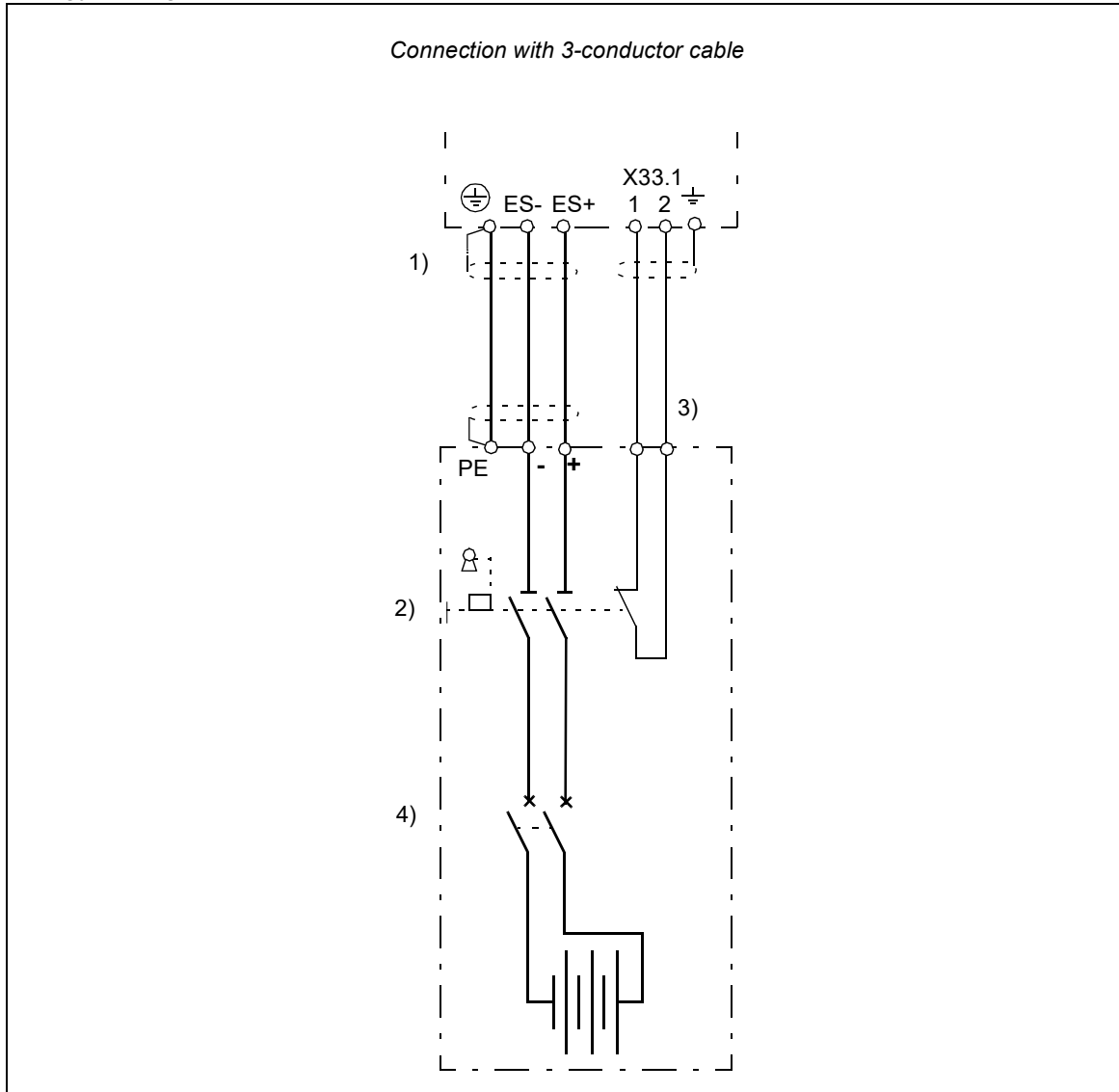
6. If more than one cable go through a grommet, seal the grommet by applying Loctite 5221 (catalogue number 25551) inside the grommet.



Connecting the energy storage cable and load disconnected indicator cable

■ Connection diagram

This diagram shows the example connections between the DC/DC converter unit and an energy storage.



Notes:

Connection of the DC/DC converter unit with a single DC/DC converter module. In case of a parallel modules, each module must have the output cabling of its own. The cablings must also be identical (cable type, cross-sectional area, and length).

- 1) Shielded 3-conductor cable, and 360 degree grounding of the cable shield at the cable entry. When you use parallel cables, make sure they are identical (type, cross-sectional area, length, etc.).
- 2) Disconnecter/disconnecting device for service purposes. See [Energy storage disconnecting device](#) on page 37.
- 3) Connection to the load disconnected indicator [P13.x] on the cabinet door. See [Selecting the energy storage](#) on page 36.
- 4) Protective circuit breaker. See [Selecting the protective circuit breaker of the energy storage](#) on page 37.

■ Connection procedure of the energy storage cables

For the cable types, see [Selecting and routing the energy storage cables](#) on page 38.

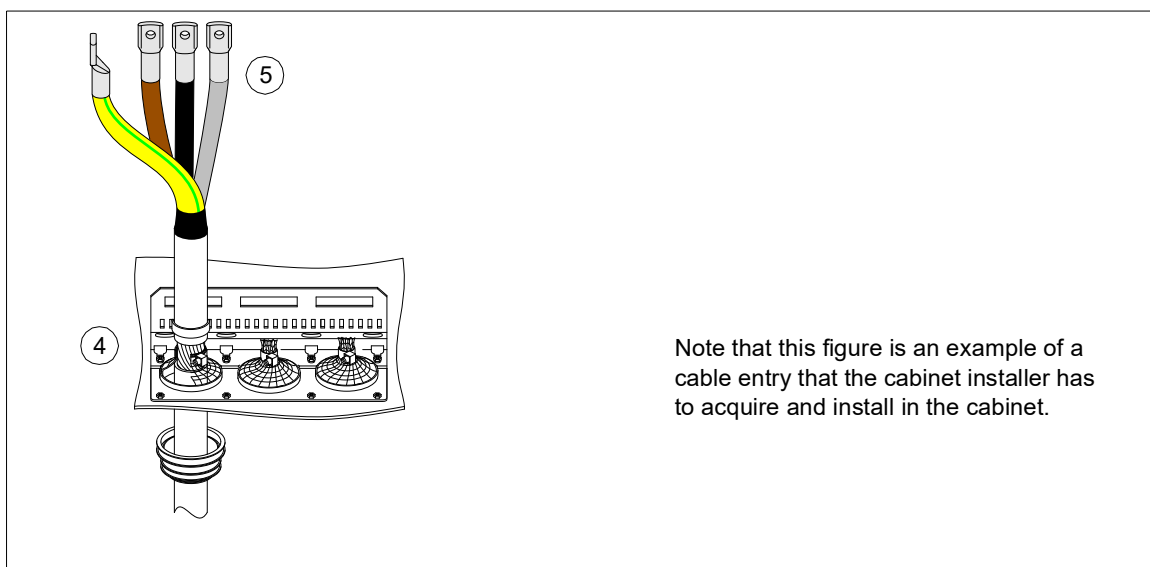


WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.

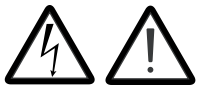


WARNING! With aluminum cables, apply grease to stripped conductors before attaching them to non-coated aluminum cable lugs. Obey the grease manufacturer's instructions. Aluminum-aluminum contact can cause oxidation in the contact surfaces.

1. Repeat the steps described in section [Electrical safety precautions](#) on page 42.
2. Open the door of the DC/DC converter cubicle and remove the shrouding.
3. Lead the cables into the cubicle.
4. Ground the cable shield 360 degrees at the cable entry. See the instructions by the cabinet installer. An example grounding arrangement is shown below.
5. Cut the cables to suitable length. Strip the cables and conductors, and install the cable lugs at the end of the conductors.
6. Twist the cable screens into bundles and connect them to the protective grounding busbar (PE) of the cabinet.
7. Connect the conductors to appropriate terminals. See the connection diagram of the cabinet installer. For the tightening torques and busbars, see [Tightening torques](#) on page 111 and chapter [Dimensions](#).
8. Refit any shrouding removed earlier and close the cubicle doors.
9. At the energy storage, connect the cables according to the instructions of the energy storage manufacturer, or the cabinet installer of the DC/DC converter.



■ Connection procedure of the load disconnected indicator cable



WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.

1. Repeat the steps described in section [Electrical safety precautions](#) on page 42.
2. Open the door of the DC/DC converter cubicle and remove the shrouding.
3. Run the load disconnected indicator cable into the cubicle as described in section [Grounding the outer shields of the control cables at the cabinet cable entry](#) on page 45.
4. Make a 360° grounding of the cable shield at the cable entry. See [Grounding the outer shields of the control cables at the cabinet cable entry](#) on page 45.
5. Route the cable to terminal block [X33.1] terminals 1 and 2 as shown in the connection diagram above. See also the circuit diagrams delivered with the unit and [Cabinet layout](#) on page 18. Use the existing trunking in the cabinet wherever possible. Use sleeving if cables are laid against sharp edges.
6. Connect the cable.
7. Refit any shrouding removed earlier and close the cubicle doors.



Installing optional modules

See section [Overview of the control connections on the BCU control unit](#) on page 24 for the available slots for each module.



WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.

1. Repeat the steps described in section [Electrical safety precautions](#) on page 42.
2. Ensure by measuring that the I/O terminals of the control unit (especially the relay output terminals) are safe.
3. Insert the module carefully into its slot on the control unit.
4. Fasten the module. For instructions, see the documentation of the module.
5. Connect the necessary wiring to the module following the instructions given in the documentation of the module and section [Connecting the control cables for the converter unit](#) on page 45.
6. Check the installation and that it is safe to reconnect power.
7. Configure the module. Refer to the instructions given in the documentation of the module as well as the appropriate firmware manual.



Connecting a PC

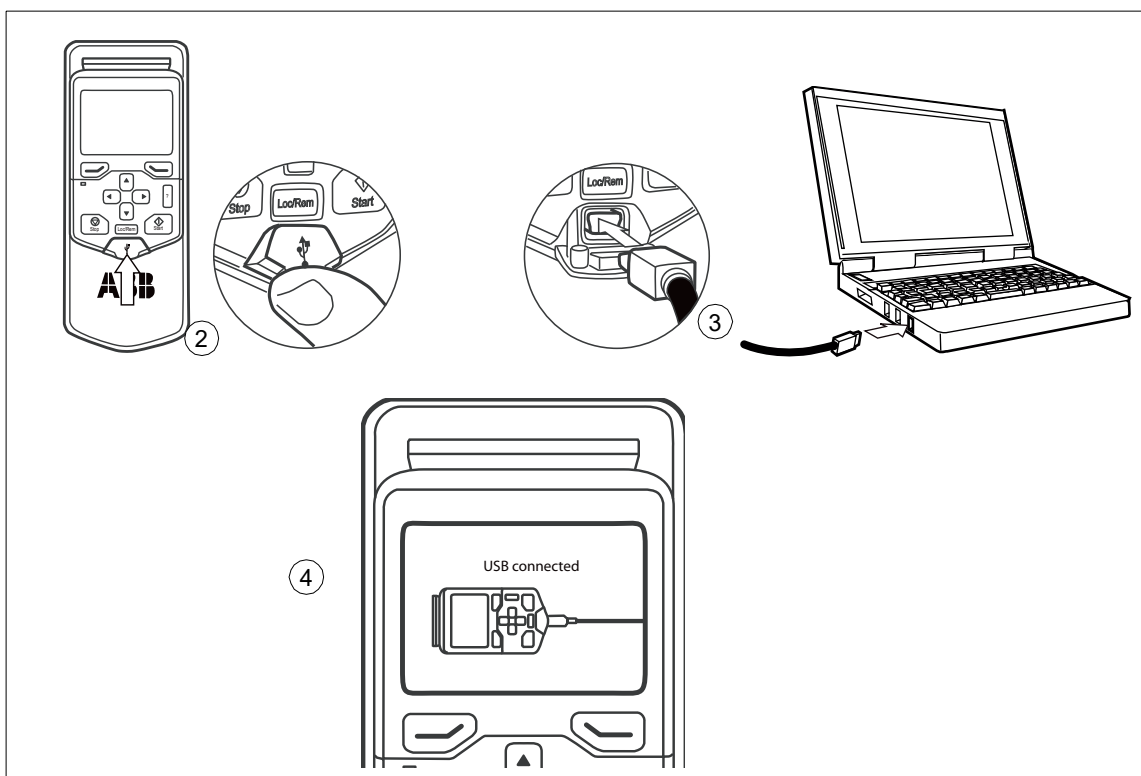
A PC (with eg. the Drive composer PC tool) can be connected to the DC/DC converter unit as follows:

1. Connect an ACS-AP-x control panel to the DC/DC converter control unit either by using an Ethernet (eg. CAT5E) networking cable, or by inserting the panel into the panel holder (if present).



WARNING! Do not connect the PC directly to the control panel connector of the DC/DC converter unit as this can cause damage.

2. Remove the USB connector cover on the front of the control panel.
3. Connect an USB cable (Type A to Type Mini-B) between the USB connector on the control panel and a free USB port on the PC.
4. The panel displays an indication whenever the connection is active.
5. See the documentation of the PC tool for setup instructions.



For more information, see *ACS-AP-x assistant control panels user's manual* (3AUA0000085685 [English]).

6

Control unit

Contents of this chapter

This chapter





- describes the connections of the BCU control unit
- contains the specifications of the inputs and outputs of the control units.

General

The BCU control unit consists of a BCON control board (and a BIOC I/O and power supply board) built in a metal housing. The BCU is mounted separately from the converter module(s), and connected to the module(s) by fiber optic cables.

In this manual, the name “BCU” represents the control unit types BCU-02, BCU-12 and BCU-22. These have a different number of converter module connections (2, 7 and 12 respectively) but are otherwise identical.

Default I/O connection diagram

XD2D		Drive-to-drive link
1	B	Drive-to-drive link (not in use by default)
2	A	
3	BGND	
4	Shield	
X485		RS485 connection
5	B	Not in use (not in use by default)
6	A	
7	BGND	
8	Shield	
XRO1...XRO3		Relay outputs
11	NC	 XRO1: Not in use 250 V AC / 30 V DC / 2 A
12	COM	
13	NO	
21	NC	 XRO2: Fault(-1) ²⁾ (Energized = no fault) 250 V AC / 30 V DC / 2 A
22	COM	
23	NO	
31	NC	 XRO3: Fan control (DC/DC converter running, fan control on) 250 V AC / 30 V DC / 2 A
32	COM	
33	NO	
XSTO		XSTO connector
1	OUT	 XSTO connector. Both circuits (power module, control unit) must be closed for the unit to start. (IN1 and IN2 must be connected to OUT.) ⁸⁾
2	SGND	
3	IN1	
4	IN2	
5	IN1	Not in use
6	SGND	
7	IN2	
8	SGND	
XDI		Digital inputs
1	DI1	Temp fault ²⁾ (0 = overtemperature)
2	DI2	
3	DI3	
4	DI4	
5	DI5	
6	DI6	
7	DIIL	
XDIO		Digital input/outputs
1	DIO1	Not in use by default
2	DIO2	Not in use by default
3	DIOGND	Digital input/output ground
4	DIOGND	Digital input/output ground
XD24		Auxiliary voltage output
5	+24VD	+24 V DC 200 mA ⁶⁾
6	DICOM	Digital input ground
7	+24VD	+24 V DC 200 mA ⁶⁾
8	DIOGND	Digital input/output ground
DICOM=DIOGND		Ground selection switch⁷⁾
XAI		Analog inputs, reference voltage output
1	+VREF	10 V DC, R_L 1...10 kohm
2	-VREF	-10 V DC, R_L 1...10 kohm
3	AGND	Ground
4	AI1+	Not in use by default.
5	AI1-	0(2)...10 V, $R_{in} > 200$ kohm ³⁾
6	AI2+	Not in use by default.
7	AI2-	0(4)...20 mA, $R_{in} = 100$ ohm ⁴⁾
XAO		Analog outputs
1	AO1	Zero ²⁾ 0...20 mA, $R_L < 500$ ohm (not in use by default)
2	AGND	
3	AO2	Zero ²⁾ 0...20 mA, $R_L < 500$ ohm (not in use by default)
4	AGND	
XPOW		External power input
1	+24VI	24 V DC, 2.05 A
2	GND	
3	+24VI	
4	GND	
X12		Safety functions module connection (not in use in DDC)
X13		Control panel connection
X205		Memory unit connection

The table above shows the control connections of the DC/DC converter unit, and the default meaning or use of the signals in the control program.

Wire sizes and tightening torques: 0.5 ... 2.5 mm² (24...12 AWG) and 0.5 N·m (5 lbf·in) for both stranded and solid wiring.

Notes:

- 1) Use of the signal in the control program. The use is fixed and it cannot be changed by a parameter.
- 2) Default use of the signal in the control program. The use can be changed by a parameter. For the delivery-specific use, see the delivery-specific circuit diagrams.
- 3) Current [0(4)...20 mA, $R_{in} = 100 \text{ ohm}$] or voltage [0(2)...10 V, $R_{in} > 200 \text{ kohm}$] input selected by switch AI1. Change of setting requires reboot of control unit.
- 4) Current [0(4)...20 mA, $R_{in} = 100 \text{ ohm}$] or voltage [0(2)...10 V, $R_{in} > 200 \text{ kohm}$] input selected by switch AI2. Change of setting requires reboot of control unit.
- 5) Must be set to ON when the drive is the first or last unit on the drive-to-drive (D2D) link.
- 6) Total load capacity of these outputs is 4.8 W (200 mA at 24 V) minus the power taken by DIO1 and DIO2.
- 7) Determines whether DICOM is separated from DIOGND (ie, common reference for digital inputs floats).
DICOM = DIOGND ON: DICOM connected to DIOGND. **OFF:** DICOM and DIOGND separate.
- 8) The Safe torque off (STO) function is only implemented in the inverter units. When the control board is used in the DC/DC converter unit, de-energizing IN1 or IN2 of XSTO connector only stops the operation of the unit. This stopping is not safety-related and cannot be used in safety purposes.

■ External power supply for the control unit (XPOW)

The BCU must be powered from a 24 V DC, 2 A power supply. The power supply is connected to terminal block XPOW. A second supply can be connected to the same terminal block for redundancy.

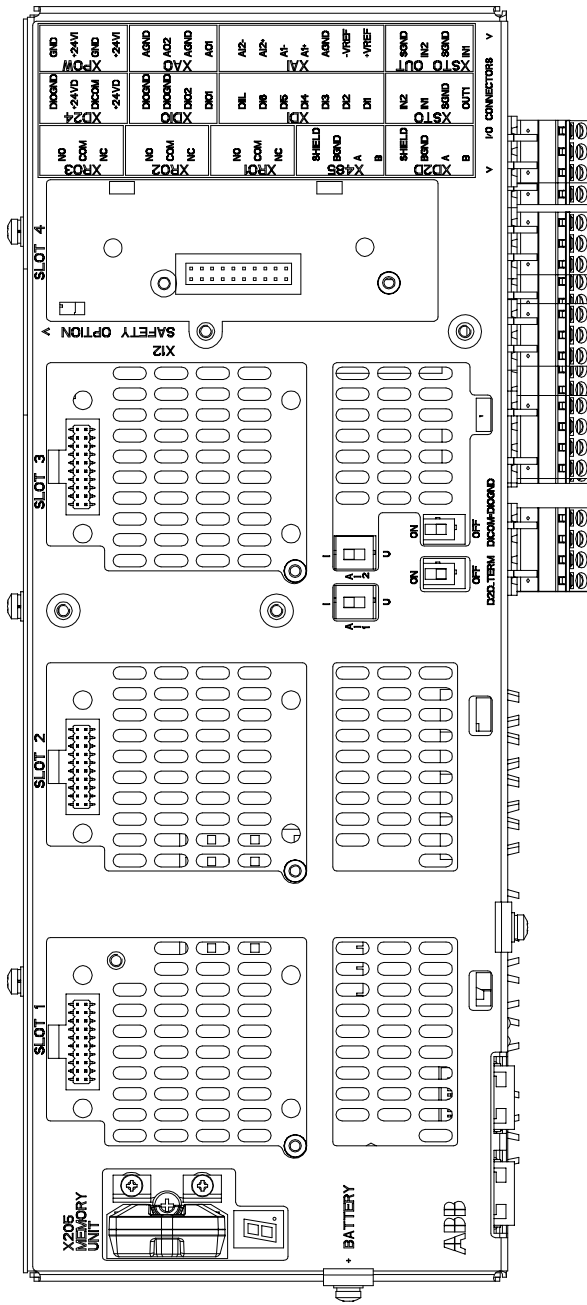
■ SDHC memory card slot

The BCU-x2 has an on-board data logger that collects real-time data from the converter to help fault tracing and analysis. The data is stored onto the SDHC memory card inserted into the SD CARD slot and can be analyzed by the ABB service personnel.

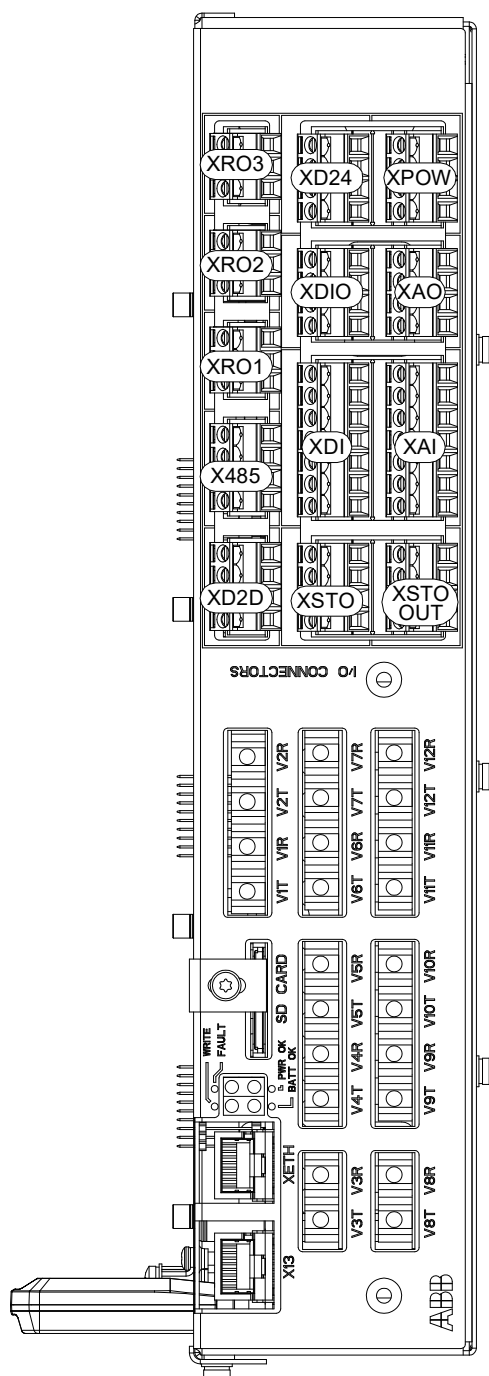
■ Drive-to-drive link (XD2D)

The DC/DC converter control program does not support Drive-to-drive link.

Layout and connections



	Description
I/O	I/O terminals (Default I/O connection diagram)
SLOT 1	I/O extension or fieldbus adapter module connection. (This is the sole location for an FDPI-02 diagnostics and panel interface.)
SLOT 2	I/O extension or fieldbus adapter module connection
SLOT 3	I/O extension, fieldbus adapter or FSO-xx safety functions module connection. FSO is not in use in DC/DC converter units.
SLOT 4	RDCO-0x DDCS communication option module connection
X205	Memory unit connection
BATTERY	Holder for real-time clock battery
AI1	Mode selector for analog input AI1 (I = current, U = voltage)
AI2	Mode selector for analog input AI2 (I = current, U = voltage)
D2D TERM	Termination switch for drive-to-drive link (D2D)
DICOM = DIOGND	Ground selection. Determines whether DICOM is separated from DIOGND (ie. the common reference for the digital inputs floats).
7-segment display Multicharacter indications are displayed as repeated sequences of characters	
	("U" is indicated briefly before "o".) Control program startup in progress
	(Flashing) Firmware cannot be started. Memory unit missing or corrupted
	Firmware download from PC to control unit in progress
	At power-up, the display may show short indications of eg. "1", "2", "b" or "U". These are normal indications immediately after power-up. If the display ends up showing any other value than those described, it indicates a hardware failure.



	Description
XAI	Analog inputs
XAO	Analog outputs
XDI	Digital inputs, Digital input interlock (DIIL)
XDIO	Digital input/outputs
XD2D	Drive-to-drive link
XD24	+24 V output (for digital inputs)
XETH	Ethernet port – Not in use
XPOW	External power input
XRO1	Relay output RO1
XRO2	Relay output RO2
XRO3	Relay output RO3
XSTO	Safe torque off connection (input signals). Safe torque off functionality is not available in the DC/DC converter units. See Default I/O connection diagram on page 54.
XSTO OUT	Safe torque off connection (output for powering XSTO inputs)
X12	(On the opposite side) Connection for FSO-xx safety functions module (optional, not in use in DC/DC converter units).
X13	Control panel connection
X485	Not in use

V1T/V1R, V2T/V2R	Fiber optic connection to converter modules 1 and 2 (VxT = transmitter, VxR = receiver)
V3T/V3R ... V7T/V7R	Fiber optic connection to converter modules 3...7 (BCU-12/22 only) (VxT = transmitter, VxR = receiver)
V8T/V8R ... V12T/V12R	Fiber optic connection to converter modules 8...12 (BCU-22 only) (VxT = transmitter, VxR = receiver)

SD CARD	Data logger memory (SD) for converter module communication
---------	--

BATT OK	Real-time clock battery voltage is higher than 2.8 V. If the LED is off when the control unit is powered, replace the battery.
FAULT	The control program has generated a fault. See the firmware manual of the converter unit.
PWR OK	Internal voltage supply is OK
WRITE	Writing to memory card in progress. Do not remove the memory card.

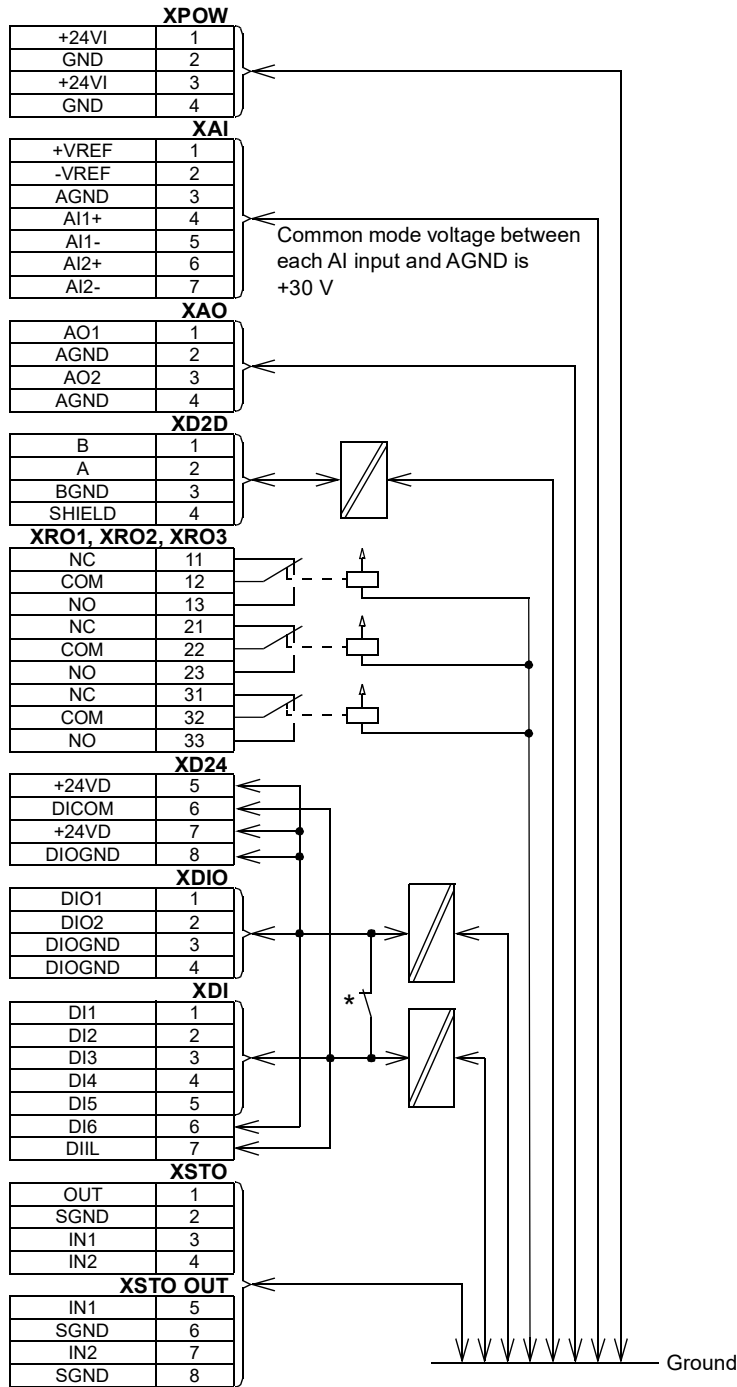
Control unit connector data

Power supply (XPOW)	<p>Connector pitch 5 mm, wire size 2.5 mm² 24 V (±10%) DC, 2 A External power supply in. Two supplies can be connected to BCU for redundancy.</p>
Relay outputs RO1...RO3 (XRO1...XRO3)	<p>Connector pitch 5 mm, wire size 2.5 mm² 250 V AC / 30 V DC, 2 A Protected by varistors</p>
+24 V output (XD24:2 and XD24:4)	<p>Connector pitch 5 mm, wire size 2.5 mm² Total load capacity of these outputs is 4.8 W (200 mA / 24 V) minus the power taken by DIO1 and DIO2.</p>
Digital inputs DI1...DI6 (XDI:1...XDI:6)	<p>Connector pitch 5 mm, wire size 2.5 mm² 24 V logic levels: "0" < 5 V, "1" > 15 V R_{in}: 2.0 kohm Input type: NPN/PNP (DI1...DI5), NPN (DI6) Hardware filtering: 0.04 ms, digital filtering up to 8 ms DI6 (XDI:6) can alternatively be used as an input for a PTC thermistor. "0" > 4 kohm, "1" < 1.5 kohm I_{max}: 15 mA (DI1...DI5), 5 mA (DI6)</p>
Start interlock input DIIL (XDI:7)	<p>Connector pitch 5 mm, wire size 2.5 mm² 24 V logic levels: "0" < 5 V, "1" > 15 V R_{in}: 2.0 kohm Input type: NPN/PNP Hardware filtering: 0.04 ms, digital filtering up to 8 ms</p>
Digital inputs/outputs DIO1 and DIO2 (XDIO:1 and XDIO:2)	<p>Connector pitch 5 mm, wire size 2.5 mm² <u>As inputs:</u> 24 V logic levels: "0" < 5 V, "1" > 15 V R_{in}: 2.0 kohm Filtering: 1 ms <u>As outputs:</u> Total output current from +24VD is limited to 200 mA</p>
<p>Input/output mode selection by parameters. DIO1 can be configured as a frequency input (0...16 kHz with hardware filtering of 4 microseconds) for 24 V level square wave signal (sinusoidal or other wave form cannot be used). DIO2 can be configured as a 24 V level square wave frequency output. See the firmware manual of the converter unit, parameter group 111.</p>	
Reference voltage for analog inputs +VREF and -VREF (XAI:1 and XAI:2)	<p>Connector pitch 5 mm, wire size 2.5 mm² 10 V ±1% and -10 V ±1%, R_{load} 1...10 kohm Maximum output current: 10 mA</p>
Analog inputs AI1 and AI2 (XAI:4 ... XAI:7).	<p>Connector pitch 5 mm, wire size 2.5 mm² Current input: -20...20 mA, R_{in}: 100 ohm Voltage input: -10...10 V, R_{in}: 200 kohm Differential inputs, common mode range ±30 V Sampling interval per channel: 0.25 ms Hardware filtering: 0.25 ms, adjustable digital filtering up to 8 ms Resolution: 11 bit + sign bit Inaccuracy: 1% of full scale range</p>
<p>Current/voltage input mode selection by switches.</p>	

Analog outputs AO1 and AO2 (XAO)	Connector pitch 5 mm, wire size 2.5 mm ² 0...20 mA, $R_{load} < 500 \text{ ohm}$ Frequency range: 0...500 Hz Resolution: 11 bit + sign bit Inaccuracy: 2% of full scale range
Drive-to-drive link (XD2D)	Connector pitch 5 mm, wire size 2.5 mm ² Physical layer: RS-485 Termination by switch
Safe torque off connection (XSTO)	Connector pitch 5 mm, wire size 2.5 mm ² Input voltage range: -3...30 V DC Logic levels: "0" < 5 V, "1" > 17 V For the drive to start, both connections must be "1"
	Note: Safe torque off (STO) functionality is not available in the DC/DC converter units. See Default I/O connection diagram on page 54.
	EMC (immunity) according to IEC 61326-3-1
Safe torque off output (XSTO OUT)	Connector pitch 5 mm, wire size 2.5 mm ² Output for powering XSTO inputs. See Default I/O connection diagram on page 54.
Control panel connection (X13)	Connector: RJ-45 Cable length < 3 m
Ethernet connection (XETH)	Connector: RJ-45 This connection is not supported by the firmware.
SDHC memory card slot (SD CARD)	Memory card type: SDHC Maximum memory size: 4 GB

The terminals of the control unit fulfill the Protective Extra Low Voltage (PELV) requirements. The PELV requirements of a relay output are not fulfilled if a voltage higher than 48 V is connected to the relay output.

Ground isolation diagram



***Ground selector (DICOM=DIOGND) settings**

<p>DICOM=DIOGND: ON All digital inputs share a common ground (DICOM connected to DIOGND). This is the default setting.</p>
<p>DICOM=DIOGND: OFF Ground of digital inputs DI1...DI5 and DIIL (DICOM) is isolated from DIO signal ground (DIOGND). Isolation voltage 50 V.</p>

7

Installation checklist

Contents of this chapter

This chapter contains an installation checklist which you must complete before you start up the converter.

Warnings



WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur. Only a qualified electrician is allowed to work on the installation.

Checklist

Do the steps in section [Electrical safety precautions](#) on page 42 before you start the work. Check the mechanical and electrical installation of the drive before start-up. Go through the checklist together with another person.

Make sure that ...	<input checked="" type="checkbox"/>
The ambient operating conditions meet the specifications given in Ambient conditions on page 157.	<input type="checkbox"/>
The drive cabinet has been fixed to floor, and if necessary due to vibration etc, also from top to the wall or roof. See Mechanical installation instructions for ACS880 multidrive cabinets (3AUA0000101764 [English]).	<input type="checkbox"/>
The cooling air flows freely in and out of the DC/DC converter unit cabinet, and air recirculation inside the cabinet is not possible (air baffle plates are in place).	<input type="checkbox"/>
If the drive has not been powered (either in storage or unused) for one to three years or more: The electrolytic DC capacitors in the DC link of the drive have been reformed. See the separate reforming instructions (available in the Internet or from your local ABB representative).	<input type="checkbox"/>
The energy storage cable has been connected to the correct terminals of the DC/DC converter and energy storage, and the terminals have been tightened. See Connecting the energy storage cable and load disconnected indicator cable on page 48. (Pull the conductors to check.)	<input type="checkbox"/>
There is an adequately sized protective earth (ground) conductor between the energy storage and the DC/DC converter, and the conductor has been connected to appropriate terminal. Connection is tight: Pull the conductors to check. Proper grounding has also been measured according to the regulations.	<input type="checkbox"/>
The energy storage has been equipped with fuses for protecting the energy storage cable in a cable short-circuit situation.	<input type="checkbox"/>
The energy storage has been equipped with a disconnecting device.	<input type="checkbox"/>
The load disconnected indicator cable has been connected to the correct terminals of DC/DC converter and to the energy storage disconnecting device. See Connecting the energy storage cable and load disconnected indicator cable on page 48. (Pull the conductors to check.)	<input type="checkbox"/>
The control cables (if any) have been connected to the appropriate terminals, and the terminals have been tightened. (Pull the conductors to check.) For example, the measured voltage values of the energy storage have been connected to the DC/DC converter. See section Energy storage voltage measurement and estimation and parameter description in ACS880 DC/DC converter control program firmware manual (3AXD50000024671 [English]).	<input type="checkbox"/>
The insulation of the installation has been measured and is OK. See section Checking the insulation of the energy storage cable on page 43.	<input type="checkbox"/>
There are no tools, foreign objects or dust from drilling inside the converter unit cabinet. There is no dust or loose dirt in front of the cabinet (from where the cooling fans could suck it inside the cabinet).	<input type="checkbox"/>
All shrouds are in place. Cabinet doors have been closed.	<input type="checkbox"/>

8

Start-up

Contents of this chapter

This chapter describes the start-up procedure of the converter unit. The information is valid for cabinet-installed ACS880-1607 DC/DC converter units.

The underlined tasks are needed for certain cases only. The option codes (if any) are given in brackets. The default device designations (if any) are given in square brackets. For example: DC/DC converter with the DC switch/disconnector ([Q11], option +F286). The same device designations are also used in the circuit diagrams, typically.


These instructions do not cover all possible start-up tasks of a customized drive and energy storage media. Always refer to the delivery-specific circuit diagrams when proceeding with the start-up.





WARNING! Only qualified by ABB electricians/engineers are allowed to do the work described in this chapter. In addition, the electrician/engineer must know the energy storage system he is about to take in use, and the DC/DC converter control program and operation principle. Obey all safety instructions in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English] and [Electrical safety precautions](#) on page 42. If you ignore the safety instructions, injury or death, or damage to the equipment can occur.



Start-up procedure


Tasks	<input checked="" type="checkbox"/>
Safety	
 WARNING! Follow the safety instructions during the start-up procedure. See <i>Safety instructions for ACS880 multidrive cabinets and modules</i> (3AUA0000102301 [English]) and <i>Electrical safety precautions</i> on page 42. Only qualified electricians are allowed to start-up the drive.	<input type="checkbox"/>
Checks/Settings with no voltage connected	
Make sure that it is safe to start the work. Obey the drive work instructions for switching off and disconnecting in <i>Safety instructions for ACS880 multidrive cabinets and modules</i> (3AUA0000102301 [English]).	<input type="checkbox"/>
Make sure that the disconnecter of the supply transformer is locked to the off (0) position, that means no voltage is, or cannot be connected to drive inadvertently.	<input type="checkbox"/>
Make sure that all external auxiliary circuits are switched off and disconnected. See the circuit diagrams delivered with the drive.	<input type="checkbox"/>
Make sure that the drive main disconnecting device is open and locked: <u>Drives with a main switch/disconnector ([Q1], option +F253):</u> Open and lock the main switch/disconnector of the drive. <u>Drives with a main breaker ([Q1], option +F255):</u> Crank the main breaker to the DISCONNECTED position.	<input type="checkbox"/>
<u>DC/DC converter with the DC switch/disconnector ([Q11], option +F286):</u> Make sure that the DC switch/disconnector [Q11] is open and locked.	<input type="checkbox"/>
Make sure that the energy storage disconnecting device is open and locked to open position (customer or system integrator-installed device).	<input type="checkbox"/>
Make sure that the mechanical and electrical installation of the converter unit has been inspected and is OK. See chapter <i>Installation checklist</i> .	<input type="checkbox"/>
Make sure that the drive is ready for the converter unit start-up: <ul style="list-style-type: none"> • The supply and inverter units have been installed according to the instructions given in their hardware manuals. • The supply unit has been started up according to the instructions given in the appropriate supply unit manual. • The inverter units have been started up according to the instructions given in the hardware manual and appropriate firmware manual. For the supply and inverter unit hardware manuals, see <i>List of related manuals</i> the inside of the front cover. Note: If the drive has been stored over one year: Reform the electrolytic DC capacitors in the DC bus of the drive. See the separate reforming instructions (available in the Internet or from your local ABB representative).	<input type="checkbox"/>
Make sure that the DC/DC converter is equipped with a control panel (option +J400), or preferably, you have a PC with the Drive composer tool connected to the converter control unit [A41].	<input type="checkbox"/>
Close the auxiliary voltage circuit breakers of the converter unit [F21.1, F26.1]. Close also other circuit breakers in between the converter control unit [A41] and the auxiliary voltage switch [Q21] of the drive supply unit. See the circuit diagrams delivered with the drive.	<input type="checkbox"/>
Close all cabinet doors.	<input type="checkbox"/>
Connecting voltage to the drive and converter control unit	
Connect the main AC voltage to the input terminals of the drive supply unit. (Close the main breaker of the supply transformer.)	<input type="checkbox"/>



Tasks	<input checked="" type="checkbox"/>
<u>If the drive is equipped with a main switch/disconnector ([Q1], option +F253):</u> Close the main switch/disconnector [Q1].	<input type="checkbox"/>
Close the auxiliary voltage switch [Q21] of the drive supply unit. The converter control unit will be powered. Important: Do not close the main breaker ([Q1], option +F255) or the main contactor [Q2] of the drive supply unit yet! You must not power up the drive DC bus yet.	<input type="checkbox"/>
Setting the parameters	
Set DC/DC converter parameters. See chapter Start-up in the <i>DC/DC converter control program firmware manual</i> (3AXD50000024671 [English]). If you need information on the use of the control panel, see <i>ACX-AP-x assistant control panels user's manual</i> (3AUA0000085685 [English]). See also <i>Drive composer start-up and maintenance PC tool user's manual</i> (3AUA0000094606 [English]).	<input type="checkbox"/>
Charging the DC/DC converter and connecting voltage to the converter	
 WARNING! Make sure that the energy storage disconnecting device is still open. Always keep the energy storage disconnected from DC/DC converter until the DC/DC converter is charged.	
Power up and charge the DC/DC converter. 1. <u>DC/DC converter with the DC switch/disconnector ([Q11], option +F286):</u> Close the main contactor [Q2] or the main breaker ([Q1], option +F255) of the drive supply unit. 2. Close the DC/DC converter charging switch [Q10.x]. The DC/DC converter disconnected indicator [P12.x] goes out. 3. After the Charging OK indicator [P11.x] illuminates, close the DC switch/disconnector [Q11]. 4. Open the DC/DC converter charging switch [Q10.x]. Note: The charging switch must be open before you can start the DC/DC converter. <u>DC/DC converter without DC switch/disconnector (= no option +F286):</u> 1. Close the main contactor [Q2] or the main breaker ([Q1], option +F255) of the drive supply unit. The DC/DC converter is energized and gets charged.	<input type="checkbox"/>
Connecting the energy storage to the DC/DC converter	
Set parameter 120.12 Run enable 1 to Off. This makes it sure that the DC/DC converter does not start automatically or unexpectedly after you connect the energy storage.	<input type="checkbox"/>
Make sure the energy storage voltage is below the DC link voltage.	<input type="checkbox"/>
 WARNING! Do not close the energy storage disconnecting device if the DC/DC converter is not connected and ready to use. Close the energy storage disconnecting device (customer or system integrator-installed device). The load disconnected indicator [P13.x] goes out.	<input type="checkbox"/>
Close the energy storage protective circuit breaker (customer or system integrator-installed device).	<input type="checkbox"/>
Testing the DC/DC converter operation	
Contact your local ABB representative for testing instructions.	<input type="checkbox"/>
Make sure that the DC/DC converter module and filter module cooling fan rotates freely in the right direction. A paper sheet set on the intake (door) gratings stays. The fans run noiselessly.	<input type="checkbox"/>




Disconnecting the DC/DC converter with DC switch/disconnector (option +F286)

Tasks	<input checked="" type="checkbox"/>
Safety	
 WARNING! Only qualified electricians are allowed to carry out the work described in this chapter. Read the complete safety instructions in <i>Safety instructions for ACS880 multidrive cabinets and modules</i> (3AUA0000102301 [English]). Ignoring the instructions can cause physical injury or death, or damage to the equipment.	<input type="checkbox"/>
Stopping the DC/DC converter	
Stop the converter unit. See <i>DC/DC converter control program firmware manual</i> (3AXD50000024671 [English]).	<input type="checkbox"/>
Disconnecting the energy storage	
Open the energy storage protective circuit breaker.	<input type="checkbox"/>
Open the energy storage disconnecting device. Lock out and tag out. The load disconnected indicator [P13.x] is lit.	<input type="checkbox"/>
Disconnecting the DC/DC converter	
Open the DC switch/disconnector ([Q11], option +F286). Lock out and tag out. The DC/DC converter disconnected indicator [P12.x] is lit.	<input type="checkbox"/>
Working inside the DC/DC converter cubicle	
If you need to work inside the DC/DC converter cubicle, you must switch off and disconnect the whole multidrive system from any (AC, DC, main or auxiliary) power sources. Obey the instructions of <i>Electrical safety precautions</i> on page 42.	<input type="checkbox"/>



Reconnecting the DC/DC converter with DC switch/disconnector (option +F286)

Tasks	<input checked="" type="checkbox"/>
Safety	
 WARNING! Only qualified electricians are allowed to carry out the work described in this chapter. Read the complete safety instructions in <i>Safety instructions for ACS880 multidrive cabinets and modules</i> (3AUA0000102301 [English]). Ignoring the instructions can cause physical injury or death, or damage to the equipment.	<input type="checkbox"/>
Reconnecting the DC/DC converter	
After working inside the DC/DC converter cubicle, close the cubicle door and obey the instructions of: <ul style="list-style-type: none"> • Connecting voltage to the drive and converter control unit, • Charging the DC/DC converter and connecting voltage to the converter and • Connecting the energy storage to the DC/DC converter on page 65. 	<input type="checkbox"/>
Starting the DC/DC converter	
Start the converter unit. See <i>DC/DC converter control program firmware manual</i> (3AXD50000024671 [English]). If you need information on the use of the control panel, see <i>ACX-AP-x assistant control panels user's manual</i> (3AUA0000085685 [English]). See also <i>Drive composer start-up and maintenance PC tool user's manual</i> (3AUA0000094606 [English]).	<input type="checkbox"/>





9

Maintenance

Contents of this chapter

This chapter instructs how to maintain the DC/DC converter unit. The information is valid for cabinet-installed ACS880-1607 DC/DC converter units.



WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.

Maintenance intervals

The table below shows the maintenance tasks which can be done by the end user. The complete maintenance schedule is available on the Internet (www.abb.com/drivesservices). For more information, consult your local ABB Service representative (www.abb.com/searchchannels).

Maintenance task/object	Years from start-up													
	0	1	2	3	4	5	6	7	8	9	10	11	12	...
Cooling fans														
Main cooling fan (speed-controlled)										R				
Main cooling fan (direct-on-line, 50 Hz)										R				
Main cooling fan (direct-on-line, 60 Hz)										R				
BDCL filter cooling fan (DOL, 50 Hz)										R				
BDCL filter cooling fan (DOL, 60 Hz)							R						R	
Cooling fan for circuit boards										R				
Cabinet cooling fan, internal (50 Hz)										R				
Cabinet cooling fan, internal (60 Hz)							R						R	
Cabinet cooling fan, IP54 (50 Hz)										R				
Cabinet cooling fan, IP54 (60 Hz)							R						R	
Batteries														
Control panel battery										R				
Control unit battery							R						R	
Connections and environment														
Cabinet door filters IP54		R	R	R	R	R	R	R	R	R	R	R	R	R
Quality of supply voltage		P	P	P	P	P	P	P	P	P	P	P	P	P
Spare parts														
Spare parts		I	I	I	I	I	I	I	I	I	I	I	I	I
Reforming of DC circuit capacitors, spare modules and spare capacitors		P	P	P	P	P	P	P	P	P	P	P	P	P
Other useful tasks														
Cleaning IP22 and IP42 air inlet and outlet meshes		I	I	I	I	I	I	I	I	I	I	I	I	I
Checking tightness of cable and busbar terminals. Tightening if needed.		I	I	I	I	I	I	I	I	I	I	I	I	I
Checking ambient conditions (dustiness, moisture, temperature)		I	I	I	I	I	I	I	I	I	I	I	I	I
Cleaning heatsinks of DC/DC converter module		I	I	I	I	I	I	I	I	I	I	I	I	I

4FPS10000292961 G

Symbols

I Inspection (visual inspection and maintenance action if needed)

Performance of on/off-site work (commissioning, tests, measurements or other work)

R Replacement

Maintenance and component replacement intervals are based on the assumption that the equipment is operated within the specified ratings and ambient conditions. ABB recommends annual drive inspections to ensure the highest reliability and optimum performance.

Note: Long term operation near the specified maximum ratings or ambient conditions may require shorter maintenance intervals for certain components. Consult your local ABB Service representative for additional maintenance recommendations.

Maintenance timers and counters

The control program has maintenance timers and counters that can be configured to generate a warning when a pre-defined limit is reached. Each timer/counter can be set to monitor any parameter. This feature is especially useful as a service reminder. For more information, see the firmware manual.

Cabinet

■ Cleaning the interior of the cabinet



WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.



WARNING! Use a vacuum cleaner with an antistatic hose and nozzle, and wear a grounding wristband. Otherwise an electrostatic charge might build up and damage the circuit boards.

1. Disconnect the drive from the AC power line and DC/DC converter from the energy storage and obey the instructions in section [Electrical safety precautions](#) on page 42. See [Disconnecting the DC/DC converter with DC switch/disconnector \(option +F286\)](#) on page 66.
 2. Open the cabinet door.
 3. Clean the interior of the cabinet. Use a vacuum cleaner and a soft brush.
 4. Clean the air inlets and outlets of the fans.
 5. Close the door.
-

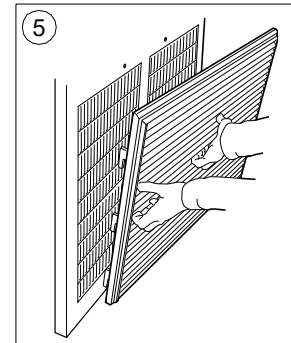
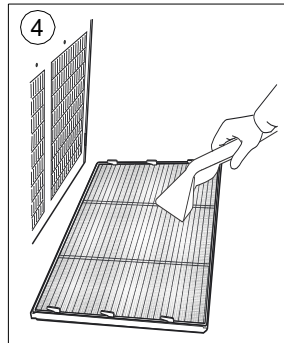
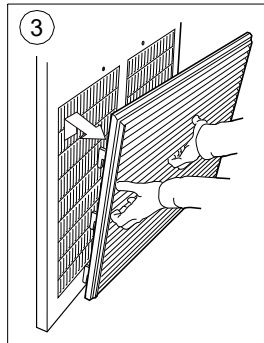
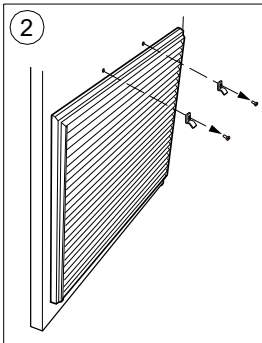
■ Cleaning the door air inlets – IP22 and IP42 (option +B053, +B054)



WARNING! Use a vacuum cleaner with an antistatic hose and nozzle, and wear a grounding wristband. Using a normal vacuum cleaner creates static discharges which can damage circuit boards.

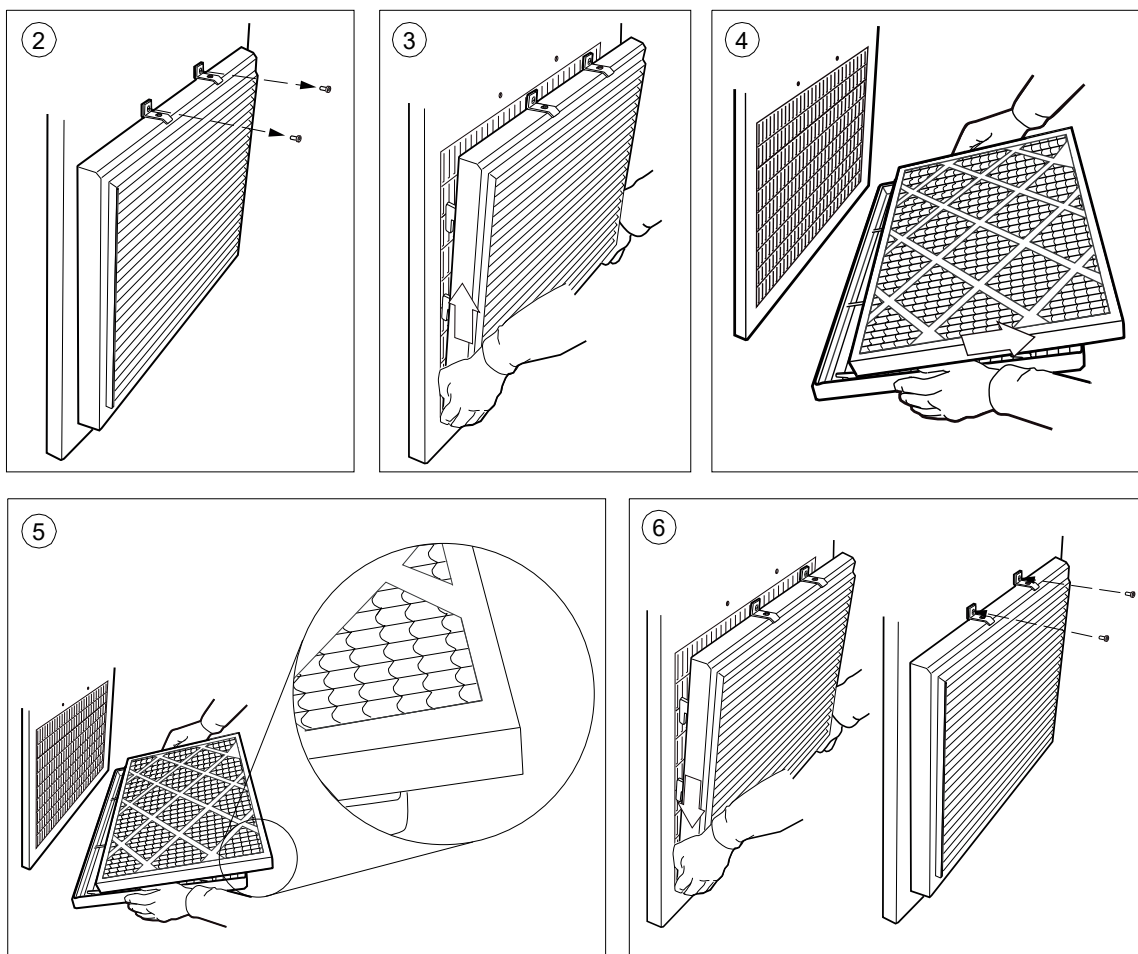
Check the dustiness of the air inlet meshes. If the dust cannot be removed by vacuum cleaning from outside through the grating holes with a small nozzle, proceed as follows:

1. Recommendation: De-energize the fans by switching off the DC/DC converter unit. Obey the instructions in section *Electrical safety precautions* on page 42.
2. Remove the fasteners at the top of the grating.
3. Lift the grating and pull it away from the door.
4. Vacuum clean or wash the grating on both sides.
5. Reinstall the grating in reverse order.



■ Cleaning the inlet (door) filters – IP54 (option +B055)

1. Recommendation: De-energize the fans by switching off the DC/DC converter unit. Obey the instructions in section [Electrical safety precautions](#) on page 42
2. Remove the fasteners at the top of the grating.
3. Lift the grating and pull it away from the door.
4. Remove the air filter mat.
5. Place the new filter mat in the grating the metal wire side facing the door.
6. Reinstall the grating in reverse order.



■ Cleaning the outlet (roof) filters (IP54)

The outlet (roof) filter in IP54 units can be accessed by pulling the grating upwards.

Power connections

■ Retightening the power connections



WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.

1. Disconnect the drive from the AC power line and DC/DC converter from the energy storage and obey the instructions in section [Electrical safety precautions](#) on page 42. See [Disconnecting the DC/DC converter with DC switch/disconnector \(option +F286\)](#) on page 66.
 2. Check the tightness of the cable connections. Use the tightening torques given in section [Tightening torques](#) on page 111. See also [Dimensions](#) on page 117.
-

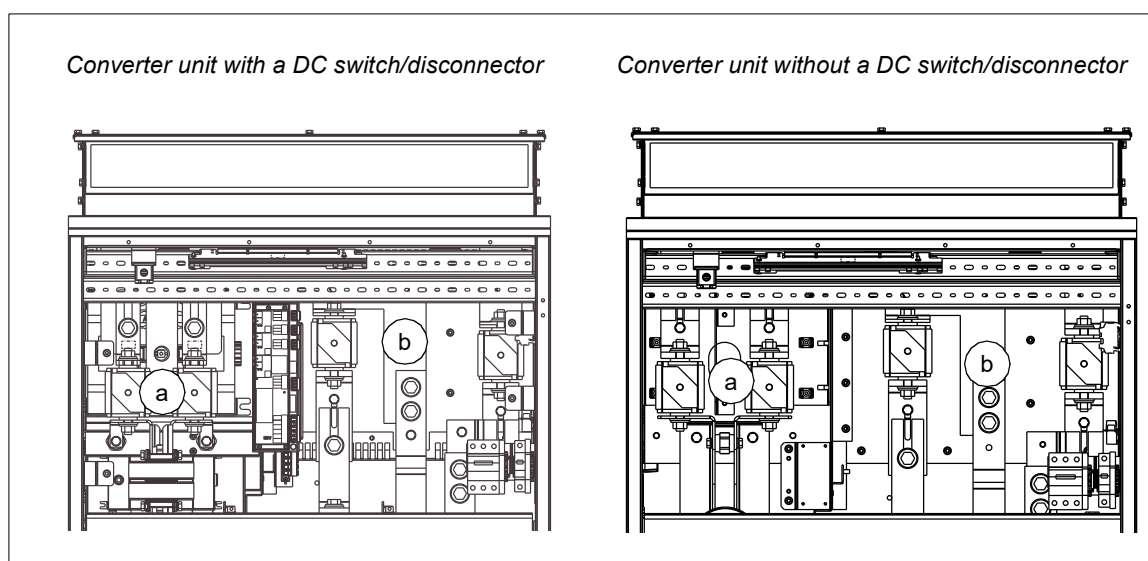
Fuses

■ Checking and replacing the DC fuses

The DC/DC converter unit has two sets of DC fuses: output DC fuses on the energy storage side and DC fuses on the DC bus side. See [Overview diagram of a drive with a converter unit](#) on page 17.

For the location of the DC fuses, see the figures:

- The converter DC fuses [F11.x] on the drive DC bus side (marked with **a** in the figure).
- The output DC fuses [F13.x] on the energy storage side are marked with **b** in the figure.



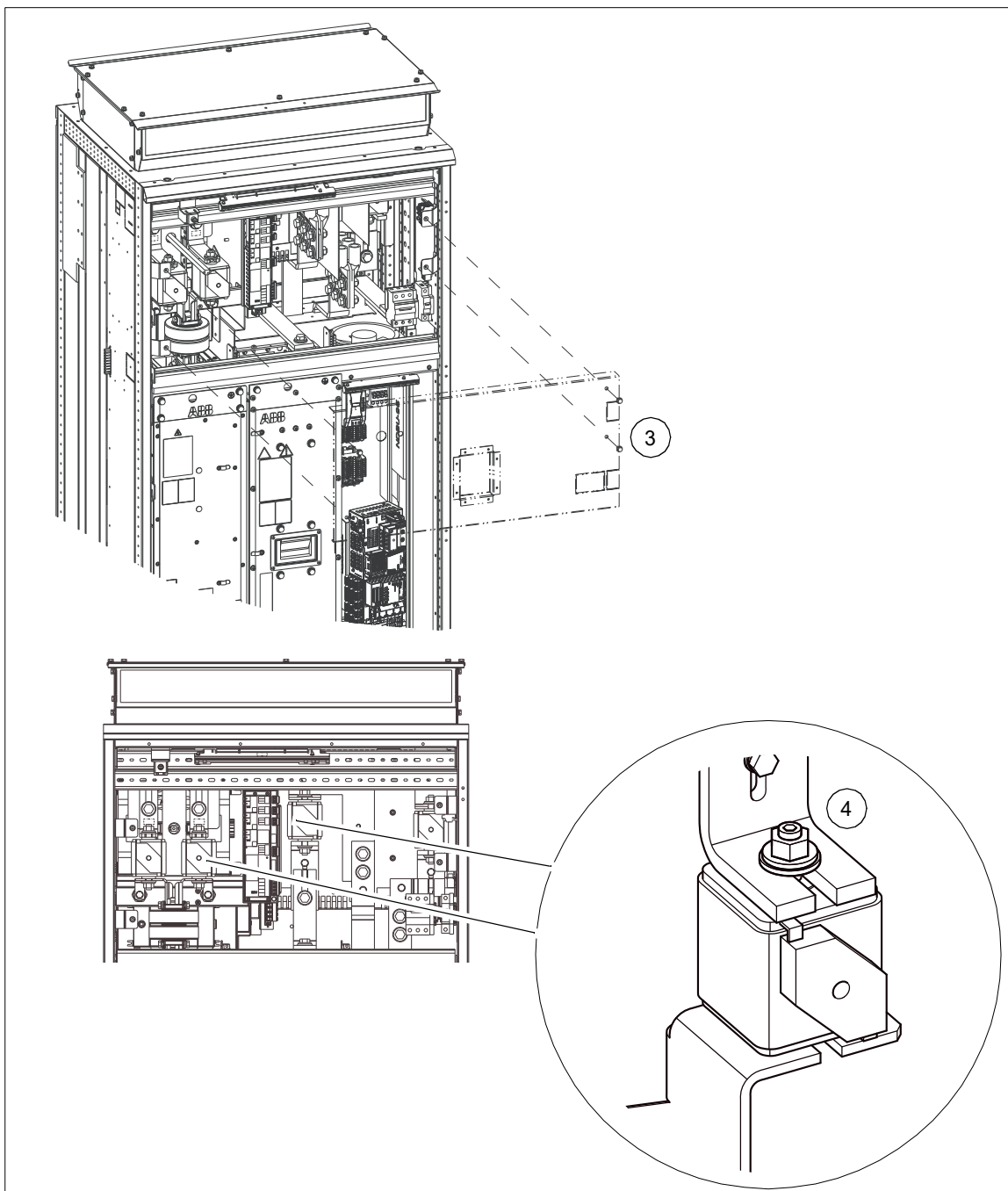
WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.

Replace a blown fuse with a new one of the same type as follows. For tables of recommended fuses, see [DC fuses \(DC bus side\)](#) on page 107 and [Output DC fuses \(energy storage side\)](#) on page 107.

1. Disconnect the drive from the AC power line and DC/DC converter from the energy storage and obey the instructions in section [Electrical safety precautions](#) on page 42. See [Disconnecting the DC/DC converter with DC switch/disconnector \(option +F286\)](#) on page 66.
2. Open the cubicle door.

76 Maintenance

3. Undo the screws of the shroud in the upper part of the cubicle. Remove the shroud.
4. Slacken the nuts of the headless screws of the fuses so that you can slide out the fuse blocks. Make note of the order of the washers on the screws.
5. Remove the screws, nuts and washers from the old fuses and attach them to the new fuses. Make sure to keep the washers in the original order.
6. Insert the new fuses into their slots in the cubicle.
7. Tighten the nuts to torque as follows:
 - Bussmann fuses: 50 N·m (37 lbf·ft)
 - Other: Refer to the fuse manufacturer's instructions.
8. Reinstall the shroud in reverse order to the above.



Fans

The lifespan of the cooling fan depends on the running time of the fan, ambient temperature and dust concentration. Replacement fans are available from ABB. Do not use other than ABB specified spare parts.

■ Replacing the cabinet cooling fan

The cabinet cooling fan (d) is behind the cable duct.

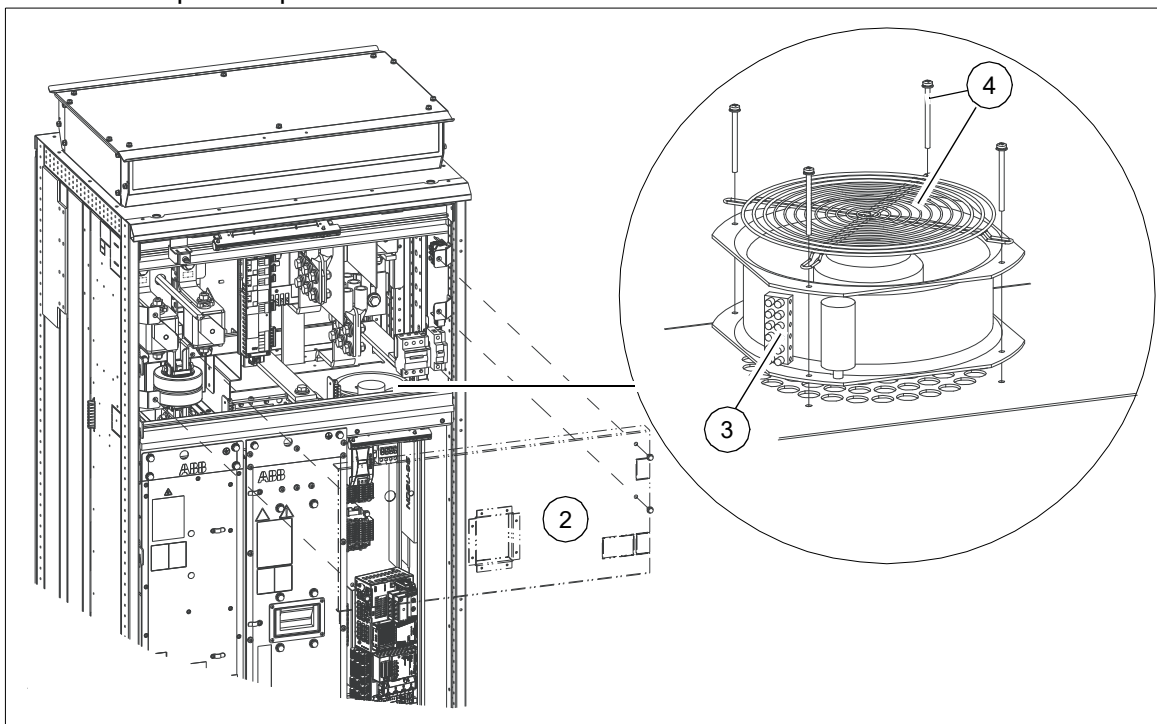


WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.



WARNING! Wear protective gloves and long sleeves! Some parts have sharp edges.

1. Disconnect the drive from the AC power line and DC/DC converter from the energy storage and obey the instructions in section [Electrical safety precautions](#) on page 42. See [Disconnecting the DC/DC converter with DC switch/disconnector \(option +F286\)](#) on page 66.
2. Remove the shrouding in front of the fan.
3. Disconnect the fan wiring.
4. Remove the fastening screws and the finger guard of the fan.
5. Install the new fan in reverse order. Check that the arrow indicating the air flow direction points upwards.



■ Replacing the speed-controlled cooling fan of DC/DC converter module

If the module is equipped with a direct-on-line cooling fan (option +C188), see page [80](#).

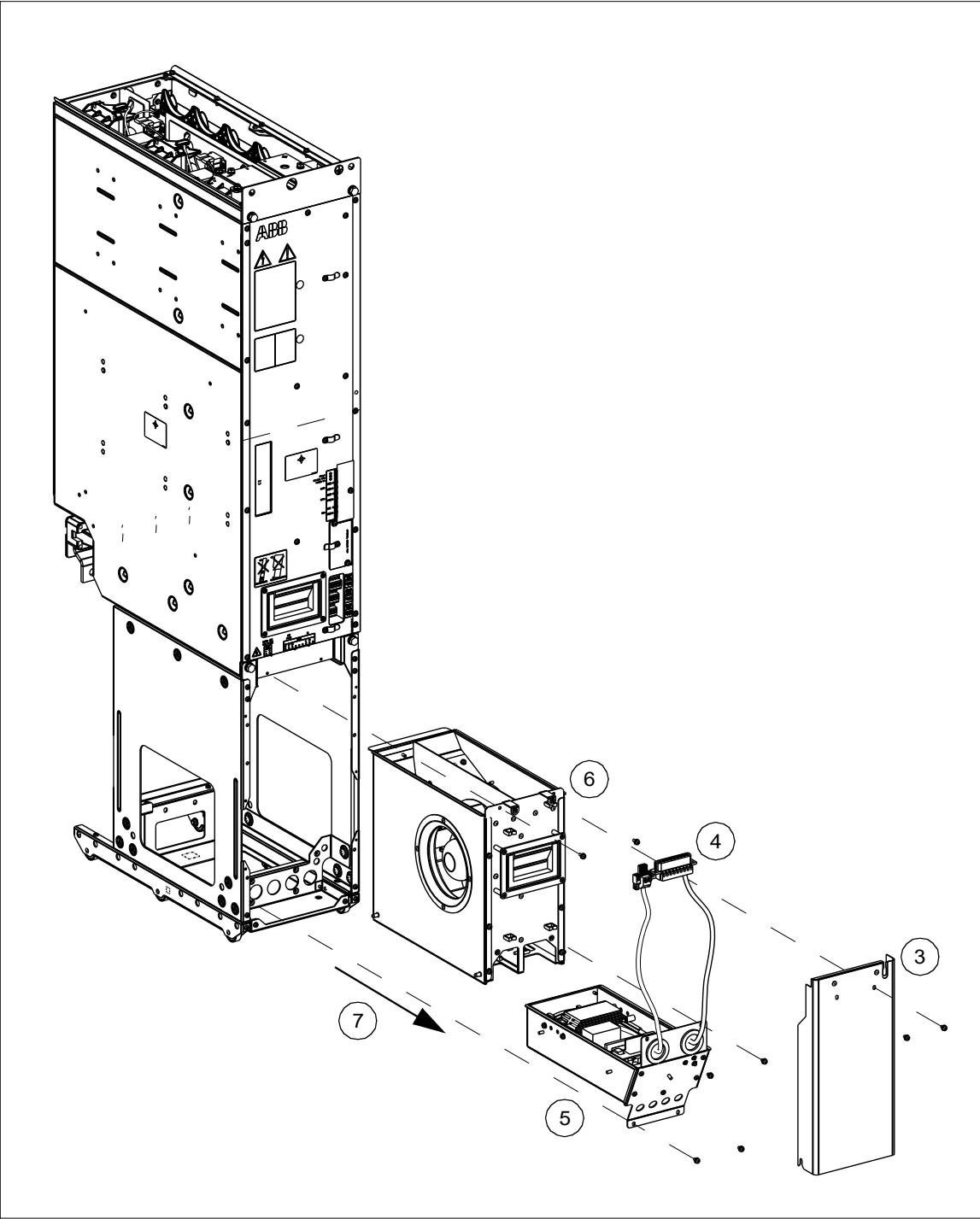


WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.



WARNING! Wear protective gloves and long sleeves! Some parts have sharp edges.

1. Disconnect the drive from the AC power line and DC/DC converter from the energy storage and obey the instructions in section *Electrical safety precautions* on page [42](#). See *Disconnecting the DC/DC converter with DC switch/disconnector (option +F286)* on page [66](#).
 2. Open the door.
 3. Remove the cover panel in front of the fan.
 4. Unplug the wiring of the fan.
 5. Remove the fan control box.
 6. Undo the screws of the fan unit.
 7. Pull the fan unit out.
 8. Replace the fan and install in reverse order.
-



■ Replacing the direct-on-line fan (option +C188) of the DC/DC converter module

If the module is equipped with a standard speed-controlled cooling fan, see page [78](#).

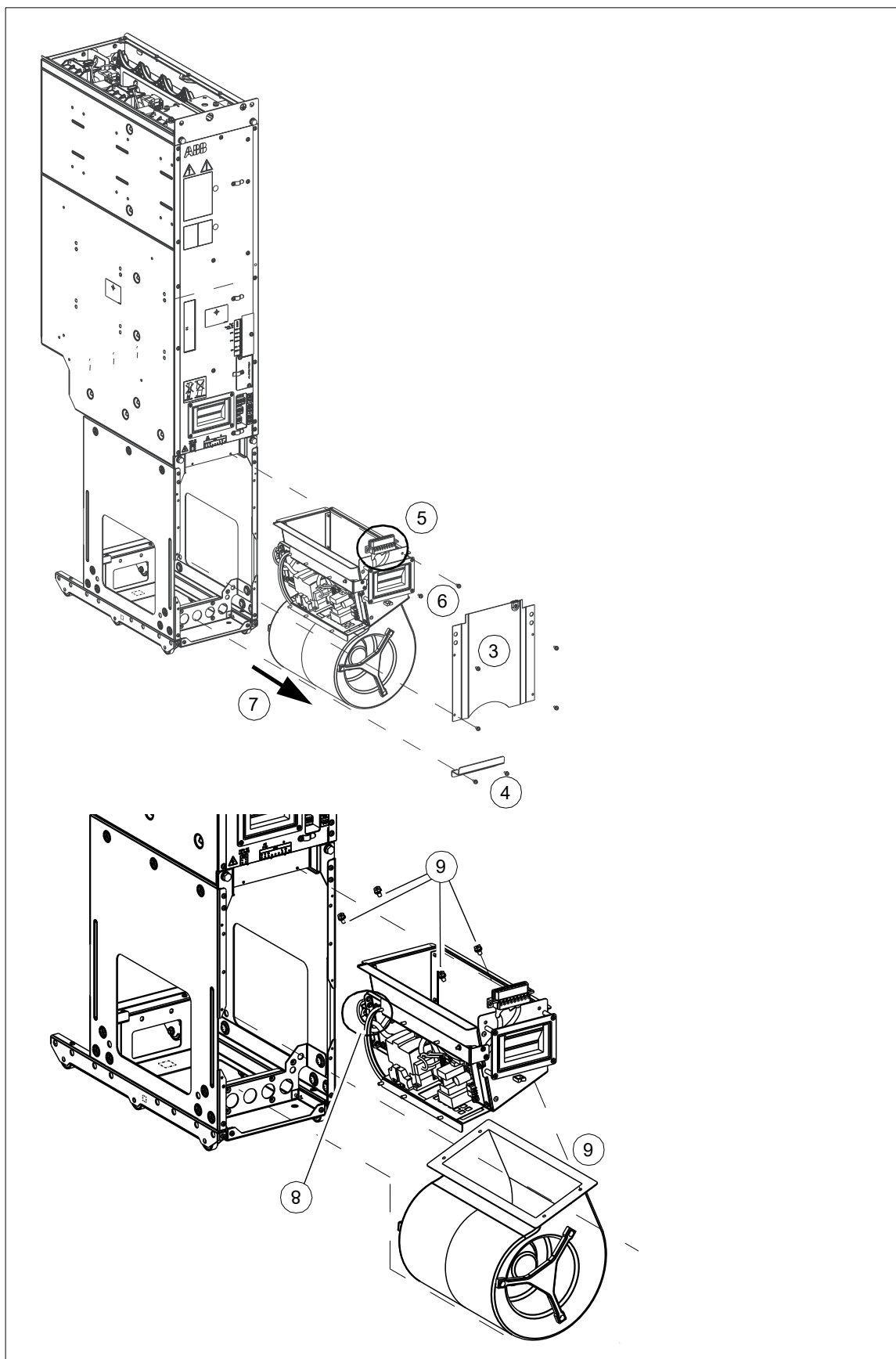


WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.



WARNING! Wear protective gloves and long sleeves! Some parts have sharp edges.

1. Disconnect the drive from the AC power line and DC/DC converter from the energy storage and obey the instructions in section *Electrical safety precautions* on page [42](#). See *Disconnecting the DC/DC converter with DC switch/disconnector (option +F286)* on page [66](#).
 2. Open the door.
 3. Remove the cover panel.
 4. Remove the bracket.
 5. Unplug the wiring of the fan assembly.
 6. Undo the screws of the fan assembly.
 7. Pull out the fan assembly.
 8. Unplug fan wire from the fan assembly.
 9. Undo the screws of the fan.
 10. Install a new fan in reverse order.
-



■ Replacing the circuit board compartment fan of the DC/DC converter module

The DC/DC converter module is equipped with a fan blowing air through the circuit board compartment. The fan is accessible from the front of the module.

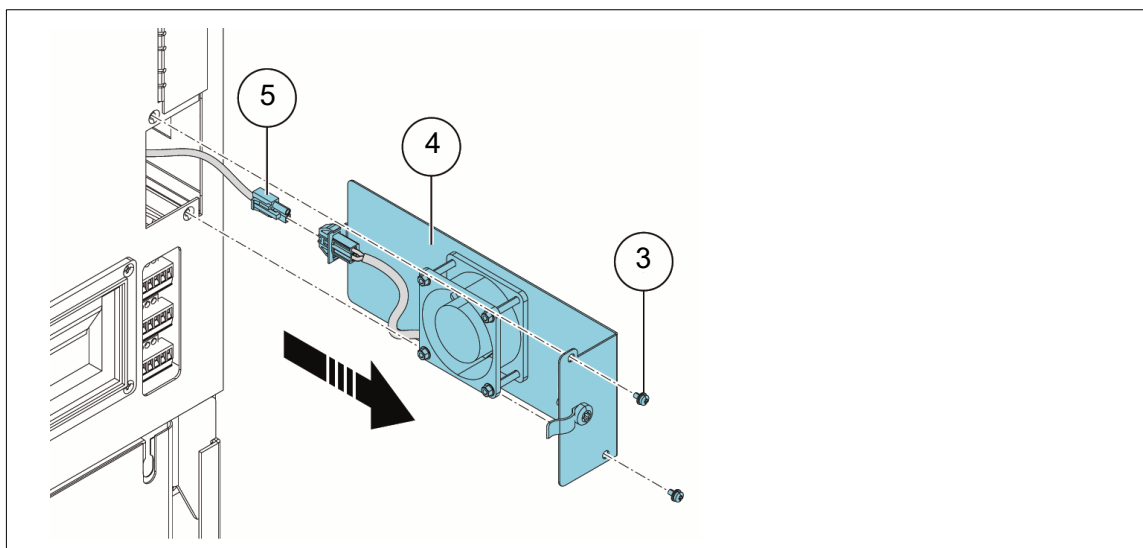


WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.

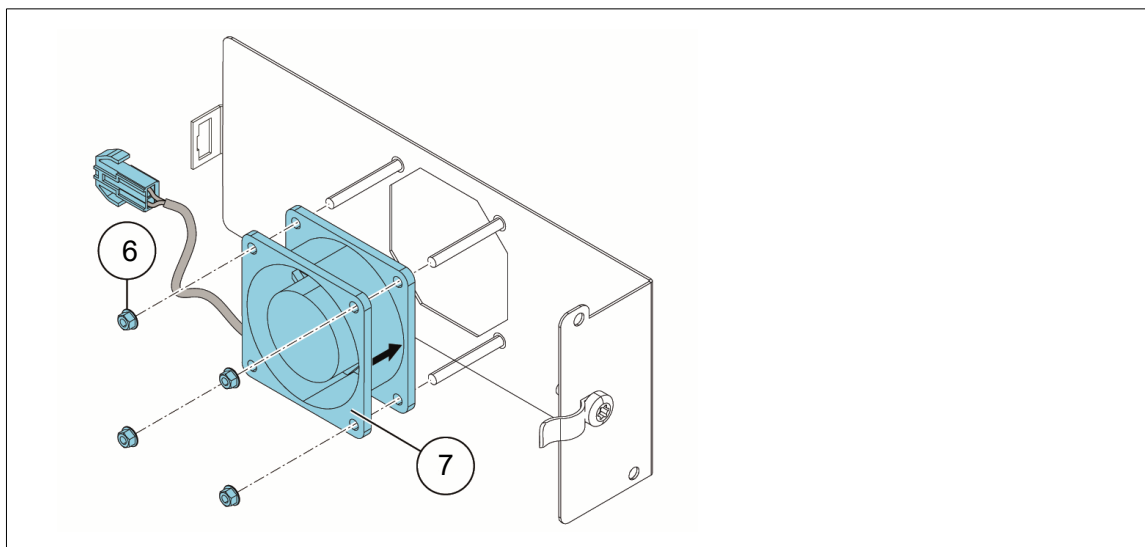


WARNING! Wear protective gloves and long sleeves! Some parts have sharp edges.

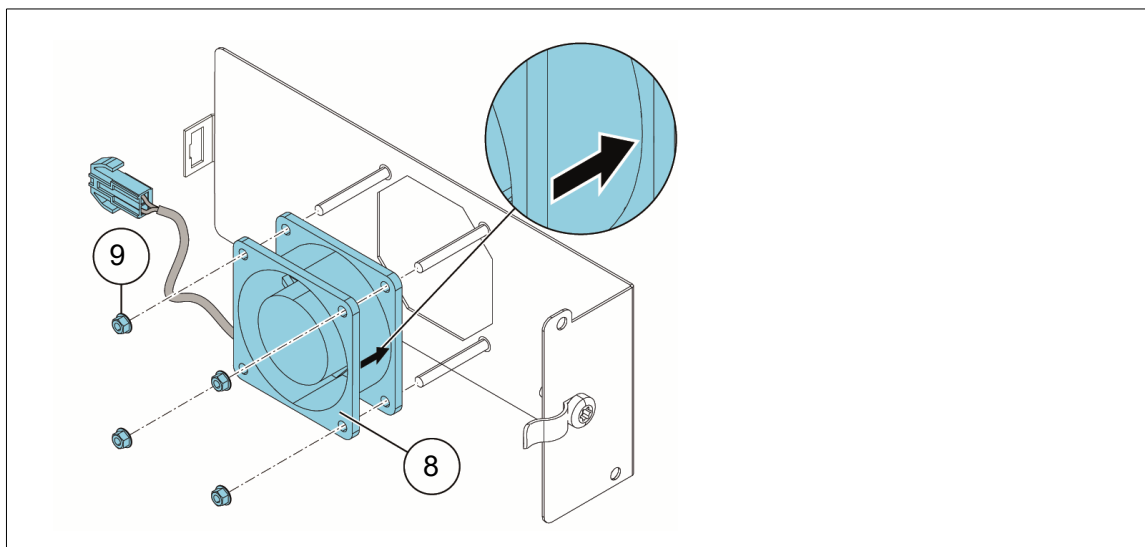
1. Disconnect the drive from the AC power line and DC/DC converter from the energy storage and obey the instructions in section [Electrical safety precautions](#) on page 42. See [Disconnecting the DC/DC converter with DC switch/disconnector \(option +F286\)](#) on page 66.
2. Open the door of the module cubicle.
3. Remove the two screws which lock the fan holder.
4. Pull the fan holder out of the module.
5. Disconnect the fan cable.



6. Remove the four nuts which hold the fan.
7. Remove the fan from the fan holder.

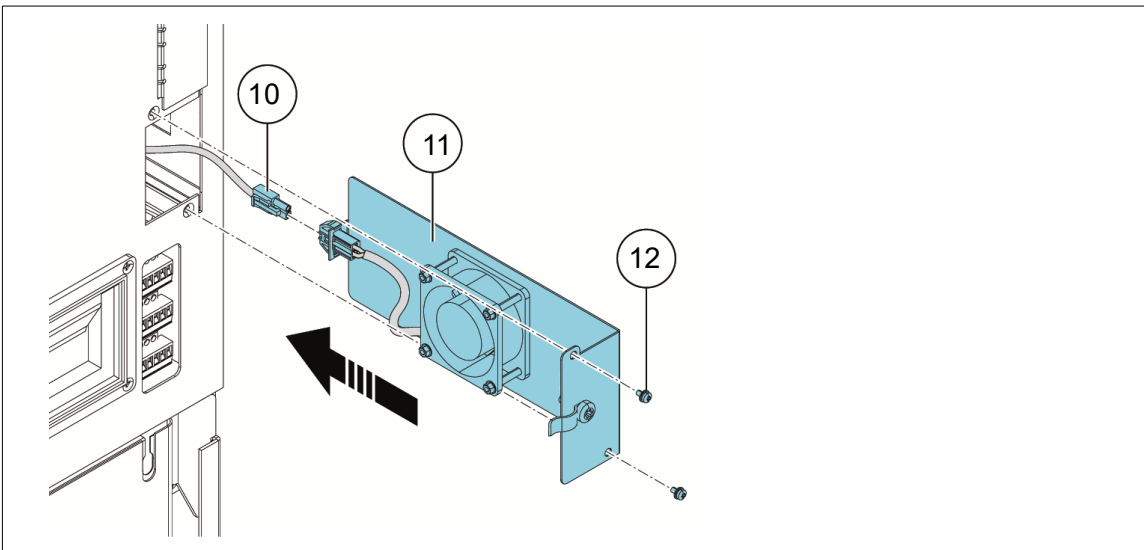


8. Put the new fan onto the threaded studs on the fan holder with the airflow direction arrow pointing towards the fan holder.
9. Install and tighten the four nuts removed earlier.



10. Connect the fan cable.
11. Align and push the fan holder into the module.

12. Install and tighten the two screws.



■ Replacing the fan of the BDCL filter

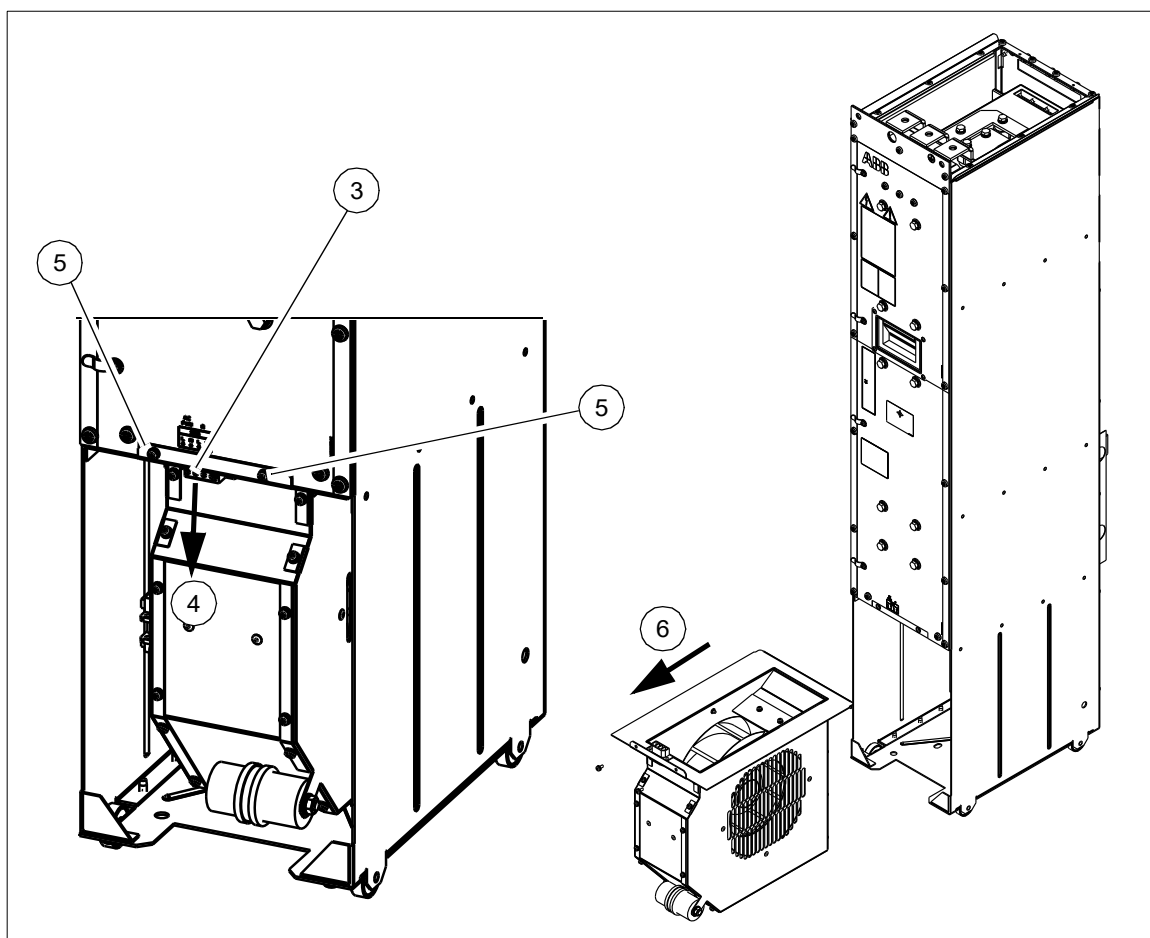


WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.



WARNING! Wear protective gloves and long sleeves! Some parts have sharp edges.

1. Disconnect the drive from the AC power line and DC/DC converter from the energy storage and obey the instructions in section [Electrical safety precautions](#) on page 42. See [Disconnecting the DC/DC converter with DC switch/disconnector \(option +F286\)](#) on page 66.
2. Open the door.
3. Remove the two locking screws of fan supply plug connector.
4. Pull the plug connector downwards to unplug the fan wiring.
5. Remove the two screws in front of the fan unit.
6. Pull the fan unit out.
7. Install a new fan in reverse order.



■ Replacing the roof fan for IP54 cabinet (option +B055)

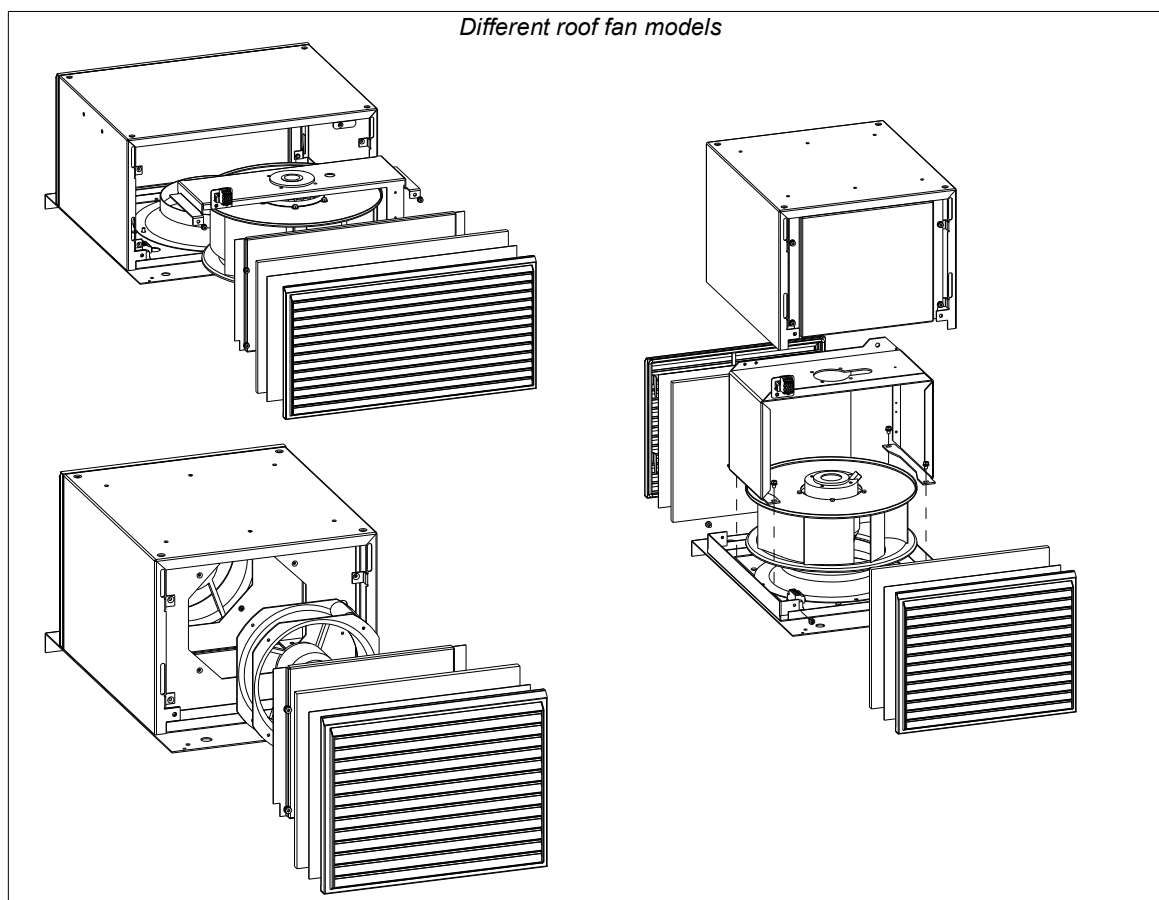


WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.



WARNING! Wear protective gloves and long sleeves! Some parts have sharp edges.

1. Disconnect the drive from the AC power line and DC/DC converter from the energy storage and obey the instructions in section *Electrical safety precautions* on page 42. See *Disconnecting the DC/DC converter with DC switch/disconnector (option +F286)* on page 66.
2. Remove all ventilation covers (lift and pull) and filters, and finally remove the roof plate on top of the outlet. Unscrew all necessary screws securing the fan and remove the fan.
3. Pull the fan unit out.
4. Install a new fan in reverse order.



DC/DC converter module

■ Cleaning the module

The converter module heatsink fins pick up dust from the cooling air. Modules run into overtemperature warnings and faults if the heatsink is not clean. When necessary, clean the heatsink as follows.



WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.



WARNING! Wear protective gloves and long sleeves! Some parts have sharp edges.



WARNING! Use a vacuum cleaner with an antistatic hose and nozzle. Using a normal vacuum cleaner creates static discharges which can damage circuit boards.

1. Disconnect the drive from the AC power line and DC/DC converter from the energy storage and obey the instructions in section [Electrical safety precautions](#) on page 42. See [Disconnecting the DC/DC converter with DC switch/disconnector \(option +F286\)](#) on page 66.
 2. Remove the cooling fan of the converter module as described under section [Fans](#) in this chapter.
 3. Blow clean, dry and oilfree compressed air through the module from bottom to top, simultaneously using a vacuum cleaner at the air outlet to trap the dust. **Note:** If there is a risk of dust entering adjoining equipment, perform the cleaning in another room.
 4. Refit the cooling fan.
-

■ Replacing the DC/DC converter module

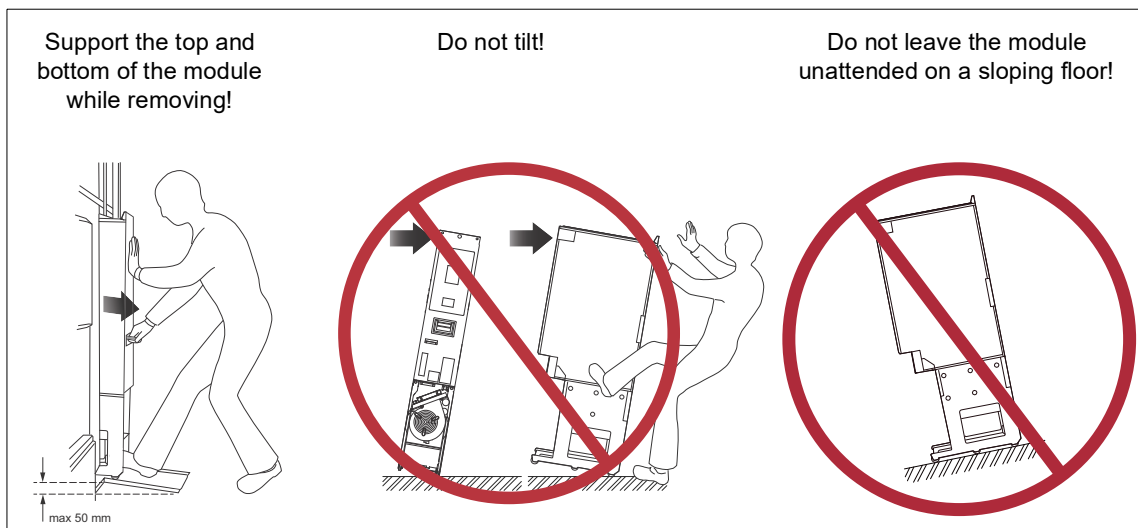


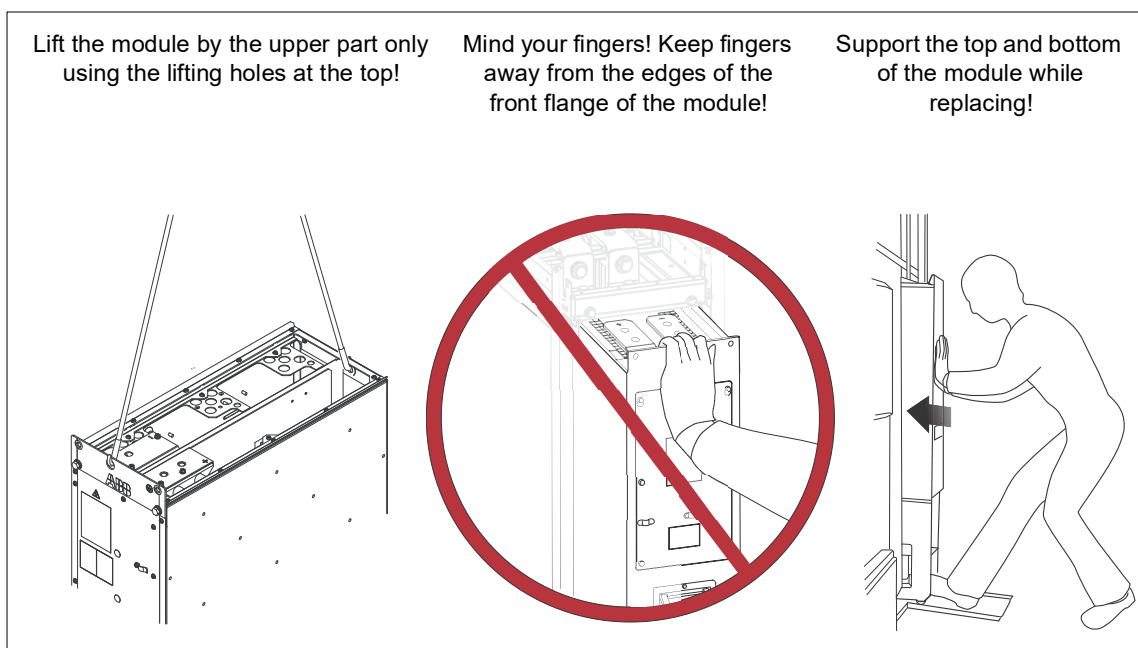
WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.



WARNING! If you ignore the following instructions, injury or death, or damage to the equipment can occur.

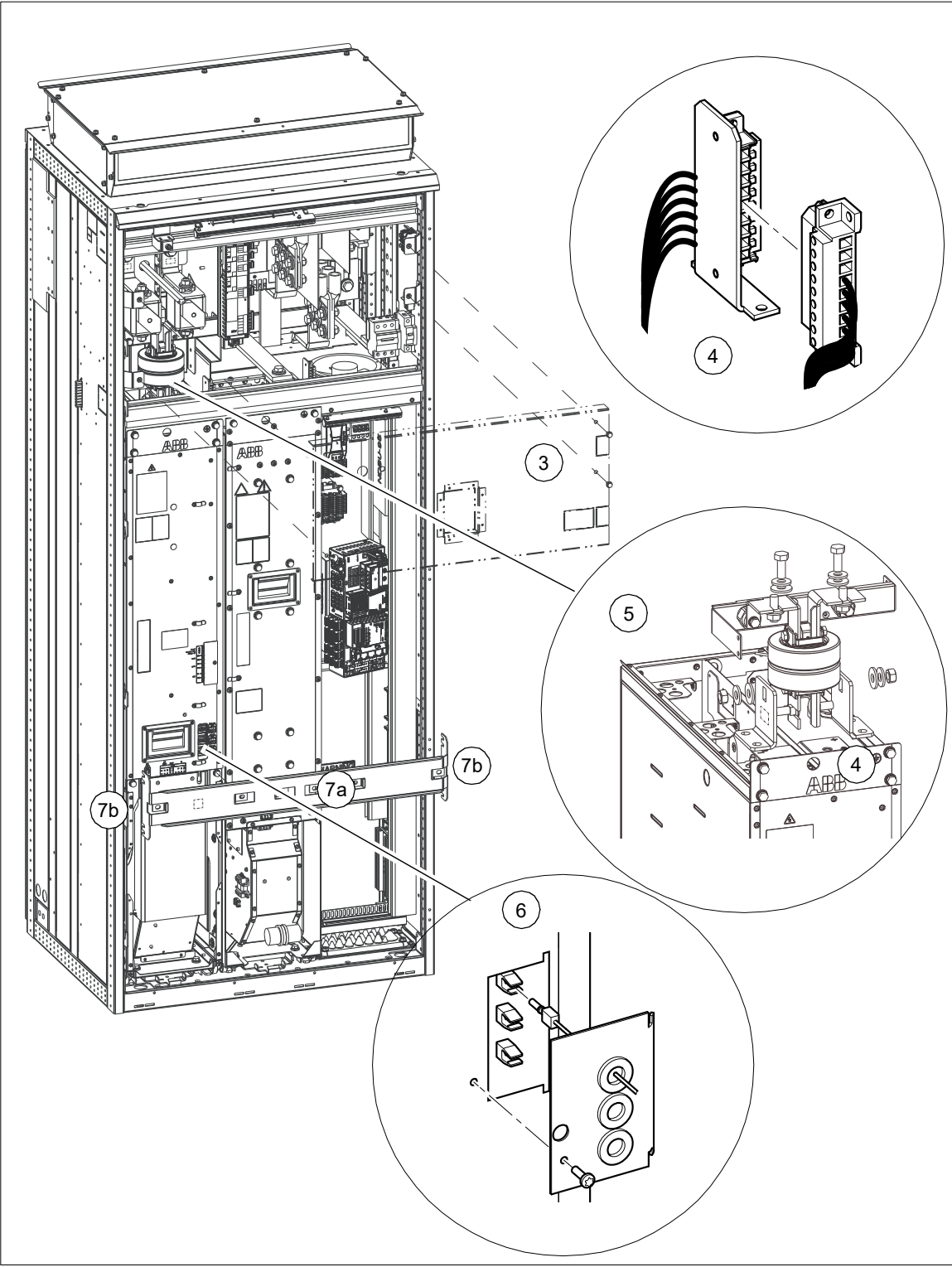
- Use extreme caution when maneuvering a module that runs on wheels. The modules are heavy and have a high center of gravity. They topple over easily if handled carelessly.
- When removing a module which is equipped with wheels, pull the module carefully out of the cubicle along the ramp. While pulling on the handle, keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.
- When replacing a module, push the module up the ramp and back into the cubicle. Keep your fingers away from the edge of the module front plate to avoid pinching them between the module and the cubicle. Also, keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.
- Wear protective gloves and long sleeves! Some parts have sharp edges.
- Do not tilt the module. Do not leave the module unattended on a sloping floor.
- Do not use the module pull-out ramp with plinth heights over 50 mm. The ramp supplied with the drive system is designed for a plinth height of 50 mm (the standard plinth height of ABB cabinets).

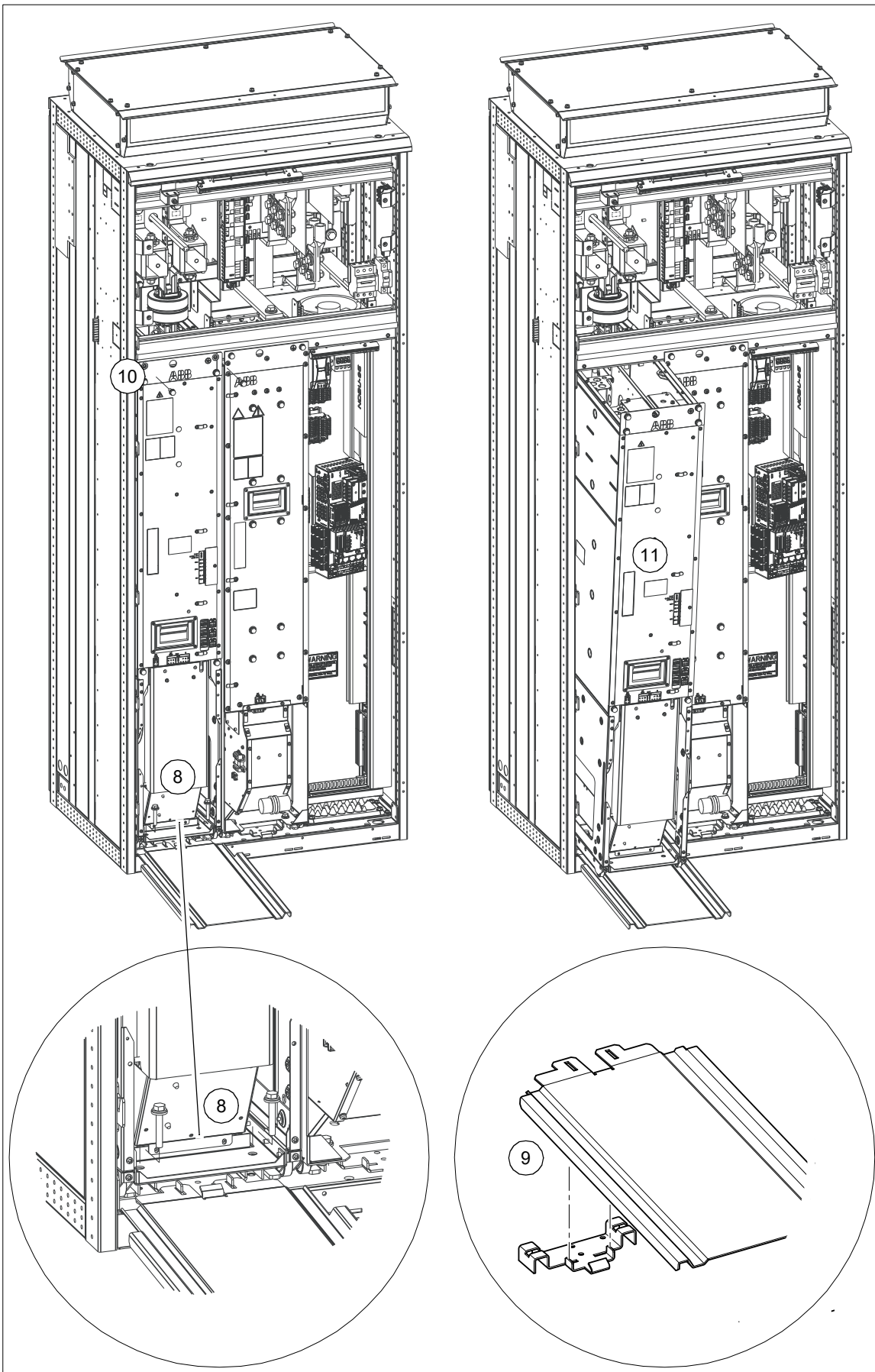




1. Disconnect the drive from the AC power line and DC/DC converter from the energy storage and obey the instructions in section [Electrical safety precautions](#) on page 42. See [Disconnecting the DC/DC converter with DC switch/disconnector \(option +F286\)](#) on page 66.
2. Open the cubicle door.
3. Undo the screws of the shroud in the upper part of the cubicle. Remove the shroud.
4. Unplug the terminal block [X50] on top of the module.
5. Disconnect the two DC busbars on top of the module. Be careful not to drop the screws inside the module! Make note of the order and position of the screws and washers.
6. Remove the cover on the fiber optic connectors in front of the module. Unplug the fiber optic cables [X52, X53]. Move the disconnected wiring aside.
7. Option +C121, marine construction: If a marine support plate is installed in front of the converter and filter modules, undo the screws that fasten the marine support to the modules (a). Loosen the screws that fasten the support to the corner posts (do not remove the screws) (b). Remove the support.
Note: Reinstall the converter and filter module screws (b) before removing the modules from the cubicle.
8. Remove the two screws that fasten the bottom of the module to the base of the cabinet.
9. Install the module pull-put ramp: lift the module pull-out ramp against the cabinet base so that the hooks of the base go into the ramp's holes.
10. Remove the two fastening screws that fasten the top of the module to the cabinet frame.
11. Pull the module carefully out of the cabinet along the ramp. While pulling on the handle, keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.

12. Replace the module: install the module in reverse order. Mind you fingers. Keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back. **Note:** Be careful not to break the fastening screws: tighten the fastening screws of the module to 22 N·m (16.2 lbf.ft) and fastening bolts of the DC output busbars to 70 N·m (51.6 lbf.ft).
 - Plug the module signal wire set to the module terminal block [X50].
 - Reconnect the fiber optic cables.
 - Fasten the shrouds.
 13. Remove the module pull-out ramp and close the cabinet doors.
-





BDCL filter

■ Replacing the BDCL filter

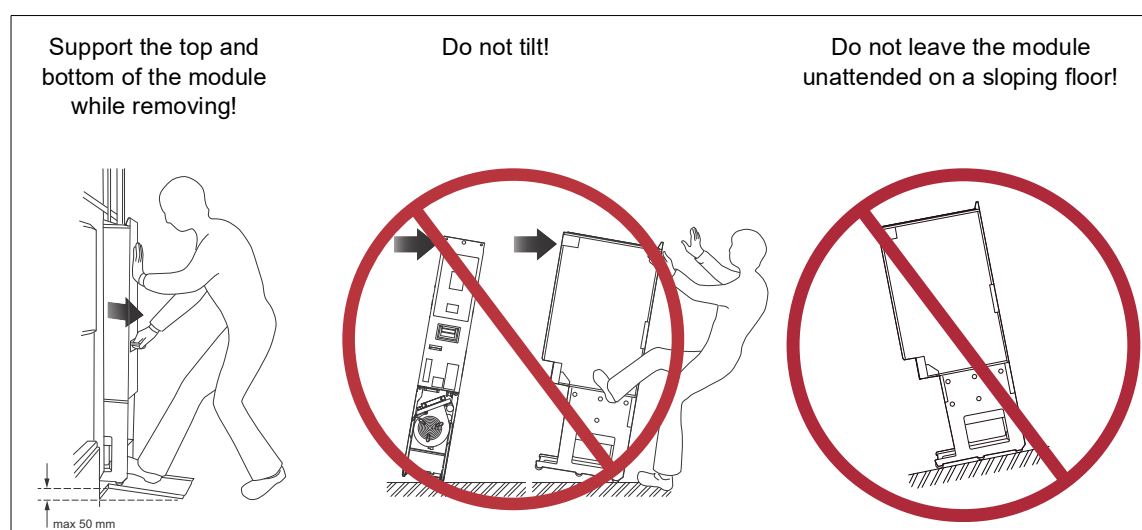


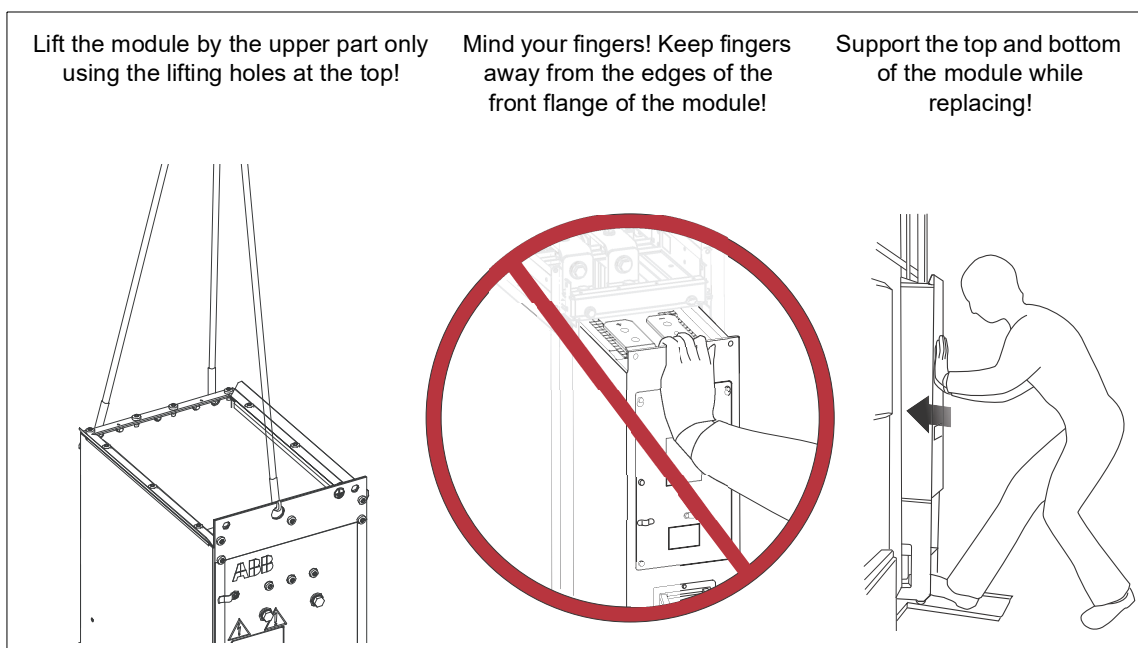
WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.



WARNING! Ignoring the following instructions can cause physical injury, or damage to the equipment:

- Use extreme caution when maneuvering a module that runs on wheels. The modules are heavy and have a high center of gravity. They topple over easily if handled carelessly.
- When removing a module which is equipped with wheels, pull the module carefully out of the cubicle along the ramp. While pulling on the handle, keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.
- When replacing a module, push the module up the ramp and back into the cubicle. Keep your fingers away from the edge of the module front plate to avoid pinching them between the module and the cubicle. Also, keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.
- Wear protective gloves and long sleeves! Some parts have sharp edges.
- Do not tilt the module. Do not leave the module unattended on a sloping floor.
- Do not use the ramp with plinth heights over 50 mm. The ramp supplied with the drive system is designed for a plinth height of 50 mm (the standard plinth height of ABB cabinets).

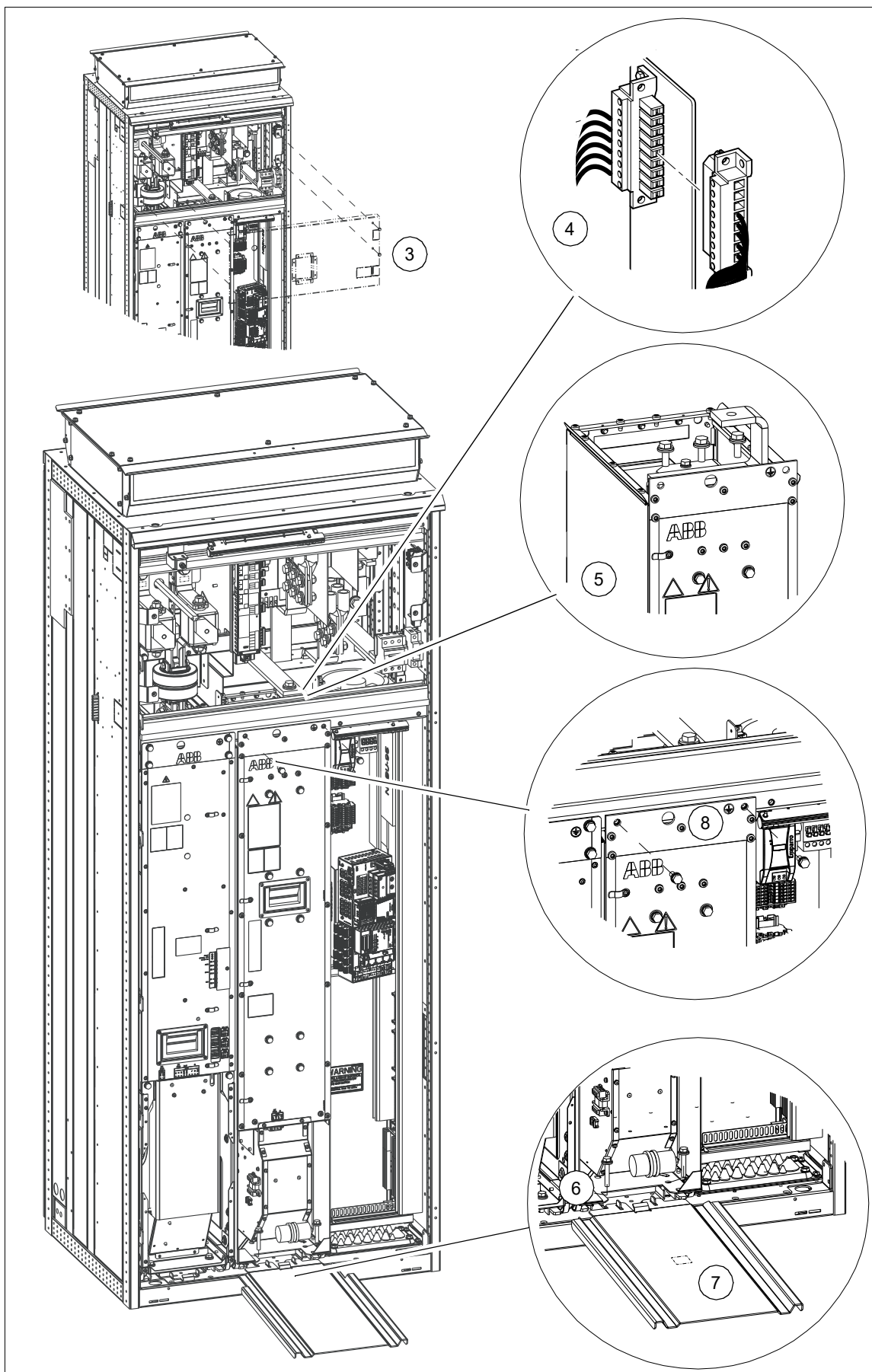


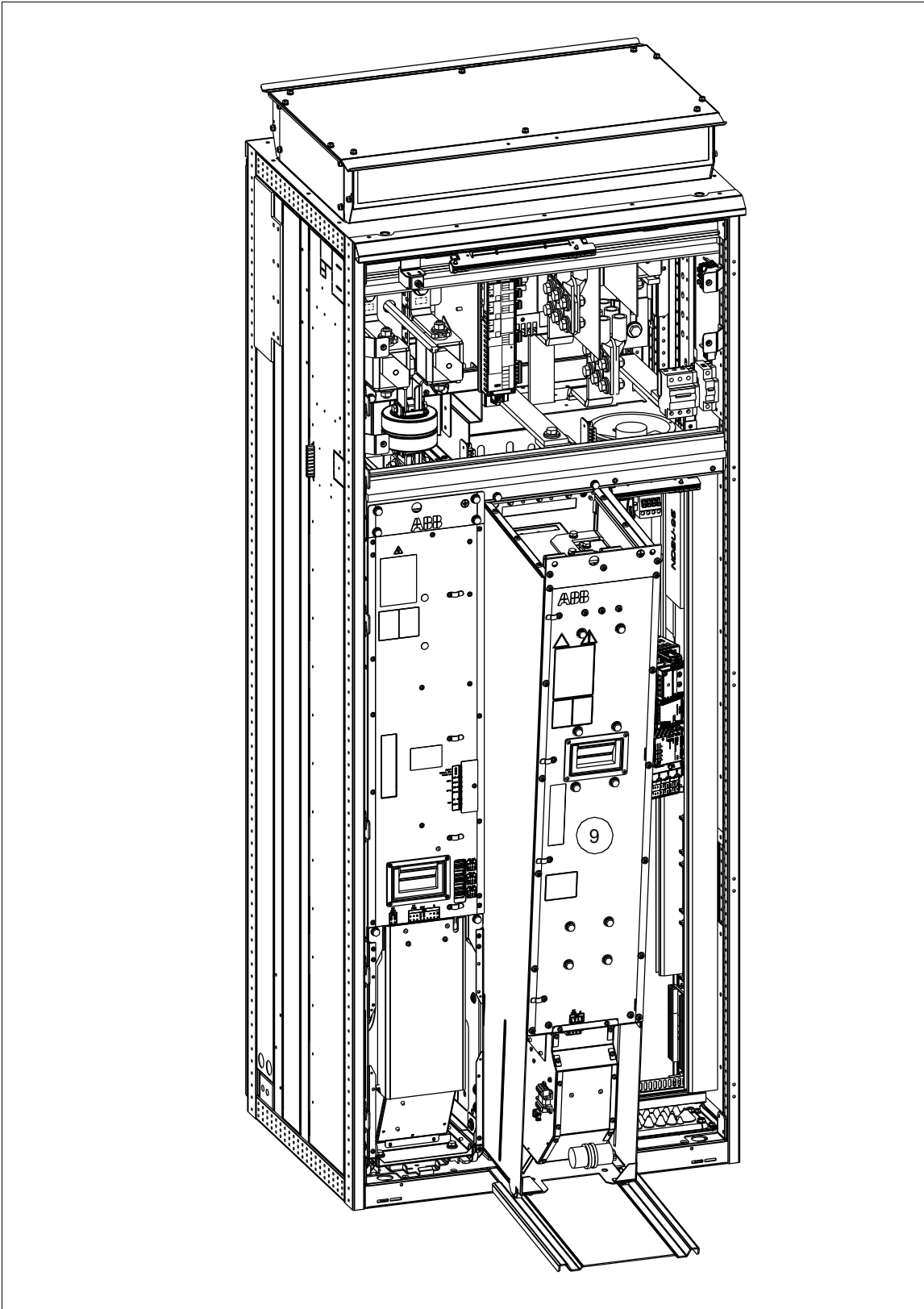


1. Disconnect the drive from the AC power line and DC/DC converter from the energy storage and obey the instructions in section [Electrical safety precautions](#) on page 42. See [Disconnecting the DC/DC converter with DC switch/disconnector \(option +F286\)](#) on page 66.
2. Open the cubicle door.
3. Undo the screws of the shroud in the upper part of the cubicle. Remove the shroud.
4. Unplug the terminal block [X30] cable on top of the module.
5. Disconnect the busbars on top of the filter module. Be careful not to drop the screws inside the module!

Option +C121, marine construction: See [Replacing the DC/DC converter module](#).

6. Remove the two screws that fasten the bottom of the module to the base of the cabinet.
7. Install the module pull-out ramp: lift the module pull-out ramp against the cabinet base so that the hooks of the base go into the ramp's holes.
8. Remove the two fastening screws that fasten the top of the module to the cabinet frame.
9. Pull the module carefully out of the cabinet along the ramp. While pulling on the handle, keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back.
10. Replace the module: install the module in reverse order. Mind you fingers. Keep a constant pressure with one foot on the base of the module to prevent the module from falling on its back. **Note:** Be careful not to break the fastening screws: tighten the fastening screws of the module to 22 N·m (16.2 lbf.ft) and fastening bolts of the DC output busbars to 42 N·m (30.98 lbf.ft).
 - Plug the module signal wire set to the module signal connector.
 - Fasten the shrouds.
11. Remove the module pull-out ramp and close the cabinet doors.





Capacitors

The DC circuit of a converter module contains several electrolytic capacitors. Their lifespan depends on the operating time, loading and ambient temperature. Capacitor life can be prolonged by lowering the ambient temperature.

Capacitor failure is usually followed by damage to the unit and an input fuse failure, or a fault trip. Contact ABB if capacitor failure is suspected. Replacements are available from ABB. Do not use other than ABB-specified spare parts. Contact an ABB service representative for spare parts and repair services.

■ Reforming the capacitors

The capacitors must be reformed if the drive has not been powered (either in storage or unused) for a certain time.

- For drives that have been non-operational for one to three years, reform the capacitors with power on for 30 minutes without a load.
- For drives that have been non-operational for more than three years, use the reforming device where applicable.

See section [Type designation labels](#) on page 27 for information on finding out the manufacturing date. For information on reforming the capacitors, see *Converter module capacitor reforming instructions* (3BFE64059629 [English]).

Control panel

■ Replacing the control panel battery

1. Turn the lid on the back of the panel counter-clockwise until the lid opens.
2. Replace the battery with a new CR2032 battery.
3. Put the lid back and tighten it by turning it clockwise.
4. Dispose of the old battery according to local disposal rules or applicable laws.



■ Cleaning the control panel

See *ACX-AP-x assistant control panels user's manual* (3AUA0000085685 [English]).

Control unit

■ BCU control unit types

There are three variants of the BCU control unit used in ACS880 drives: BCU-02, BCU-12 and BCU-22. These have a different number of converter module connections (2, 7 and 12 respectively) but are otherwise identical. The three BCU types are interchangeable as long as the number of connections is sufficient. For example, the BCU-22 can be used as a direct replacement for both BCU-02 and BCU-12.

■ Memory unit

After replacing a control unit, the existing parameter settings can be retained by transferring the memory unit from the defective unit to the new unit.

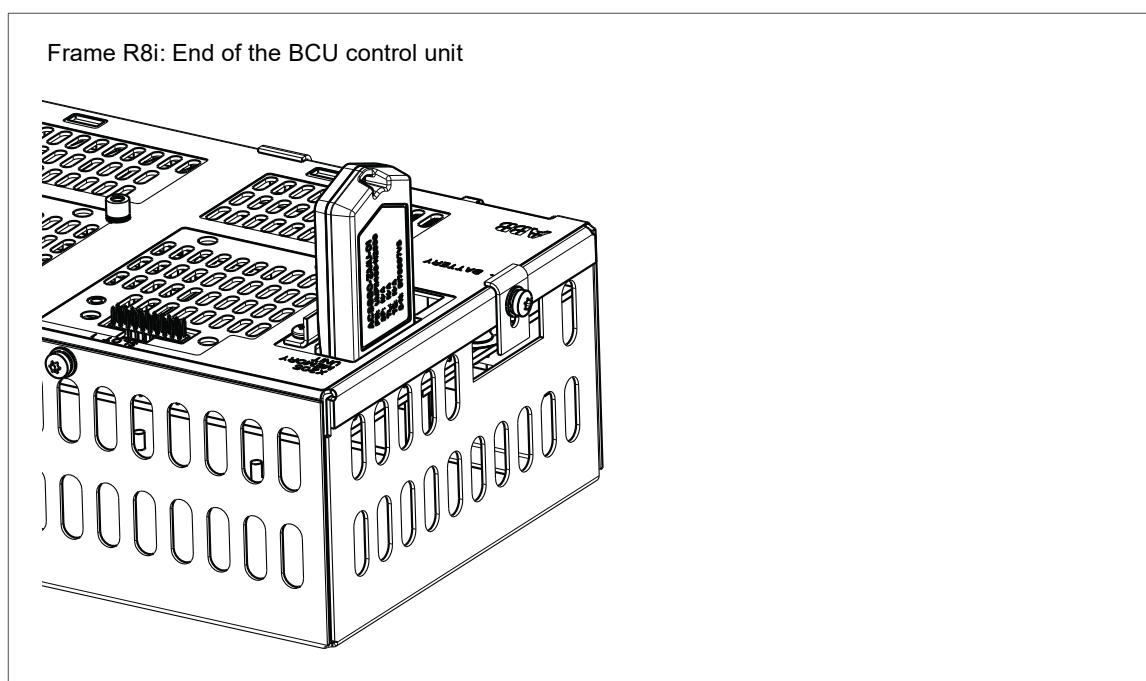


WARNING! Obey the safety instructions given in *Safety instructions for ACS880 multidrive cabinets and modules* (3AUA0000102301 [English]). If you ignore them, injury or death, or damage to the equipment can occur.



WARNING! Do not remove or insert the memory unit when the control unit is powered.

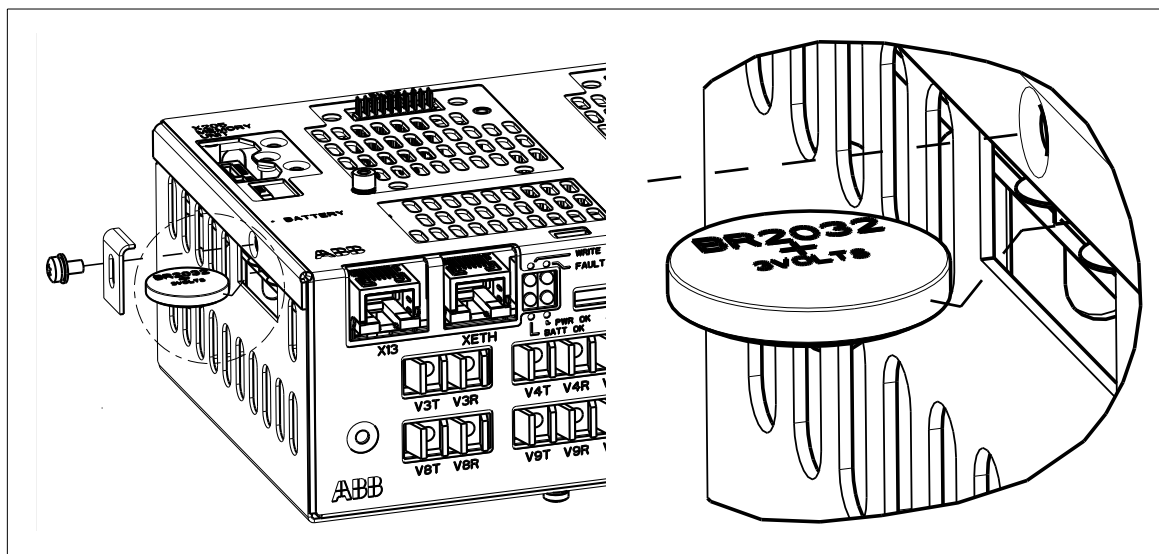
1. Disconnect the drive from the AC power line and DC/DC converter from the energy storage and obey the instructions in section [Electrical safety precautions](#) on page 42. See [Disconnecting the DC/DC converter with DC switch/disconnector \(option +F286\)](#) on page 66.
2. Make sure that the control unit is not powered.
3. Undo the fastening screw and pull the memory unit out.
4. Install a memory unit in reverse order.



■ Control unit battery

Replace the real-time clock battery if the BATT OK LED is not illuminated when the control unit is powered. For information on the LED, see [Layout and connections](#) on page 56.

1. Undo the fastening screw and remove the battery
2. Replace the battery with a new BR2032 battery.
3. Dispose the old battery according to local disposal rules or applicable laws.
4. Set the real-time clock.



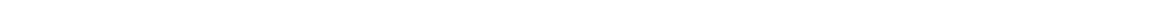
LEDs and other status indicators

This section instructs how to interpret the status indications of the ACS880-1607 DC/DC converter unit.

Warnings and faults reported by the control program are displayed on the control panel on the cabinet door. For further information, see the firmware manual.

The ACS-AP-x control panel has a status LED. The control panel mounting platform has two LEDs - a red and a green one. The DC/DC converter module has three LEDs. The cabinet has from one to three door lamps. For their indications, see the following table. For the indications of the 7-segment display of the control unit, see [Layout and connections](#) on page 56.

Location	LED and indicators	Indication
ACS-AP-x control panel (status LED)	Continuous green	The DC/DC converter unit is functioning normally.
	Flickering green	Data is transferred between the PC tool and DC/DC converter unit through the USB connection of the control panel.
	Blinking green	There is an active warning in the DC/DC converter unit.
	Continuous red	There is an active fault in the DC/DC converter unit.
Control panel mounting platform (with the control panel removed)	Red	There is an active fault in the DC/DC converter unit.
	Green	Power supply for the control board of the DC/DC converter unit is ok.
DC/DC converter module	FAULT (continuous red)	There is an active fault in the DC/DC converter module.
	ENABLE / STO (continuous green)	The DC/DC converter module is ready for use.
	ENABLE / STO (continuous yellow)	Safe torque off connectors are de-energized.
	POWER OK (continuous green)	Supply voltage on the board is OK (> 21 V).
Cabinet door lamps Note: When the white lamps are on, the DC/DC converter is disconnected from both the DC bus and the energy storage.	Charging OK indicator (green)	The DC bus of the converter modules is charged. The unit is ready for connection to the common DC bus.
	DC/DC converter disconnected (white)	The DC/DC converter unit is disconnected from the main DC bus. Note: Auxiliary voltages are to be disconnected separately.
	Load disconnected indicator (white)	The disconnector of the energy storage is switched off. For more information, see Connecting the energy storage cable and load disconnected indicator cable on page 48.



10

Technical data

Contents of this chapter

This chapter contains the technical data for the DC/DC converter units.

Ratings

Unit type ACS880- 1607-...	Consists of module type ACS880- 104-...	Frame	No-overload use							
			I_1	I_2	P_{contmax}	P_{contmax}	I_{max} output	S_N	I_{p2p}	$f_{\text{sw out}}$
			A (DC)	A (DC)	kW	hp	A (DC)	kVA	A	Hz
$U_N = 400 \text{ V}$										
0600A-3	0640A-3	R8i	600	600	305	410	900	305	22	12000
0900A-3	0900A-3	R8i	900	900	458	614	1350	458	33	12000
1200A-3	0640A-3	2×R8i	1200	1200	611	819	1800	611	11	24000
1800A-3	0900A-3	2×R8i	1800	1800	916	1229	2700	916	16	24000
$U_N = 500 \text{ V}$										
0600A-5	0590A-5	R8i	600	600	382	512	900	382	27	12000
0900A-5	0810A-5	R8i	900	900	573	768	1350	573	41	12000
1200A-5	0590A-5	2×R8i	1200	1200	764	1024	1800	764	14	24000
1800A-5	0810A-5	2×R8i	1800	1800	1146	1536	2700	1146	20	24000
$U_N = 690 \text{ V}$										
0400A-7	0410A-7	R8i	400	400	351	471	600	351	38	12000
0600A-7	0600A-7	R8i	600	600	527	707	900	527	56	12000
0800A-7	0410A-7	2×R8i	800	800	703	942	1200	703	19	24000
1200A-7	0600A-7	2×R8i	1200	1200	1054	1413	1800	1054	28	24000

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Unit type ACS880- 1607-...	Consists of module type ACS880- 104-...	Frame	Light-duty use		Heavy-duty use	
			$I_{\text{short time}}$	$P_{\text{short time}}$	I_{Hd}	P_{Hd}
			A	kW	A	kW
$U_N = 400 \text{ V}$						
0600A-3	0640A-3	R8i	450	229	510	260
0900A-3	0900A-3	R8i	675	343	765	389
1200A-3	0640A-3	2×R8i	899	458	1020	519
1800A-3	0900A-3	2×R8i	1349	687	1529	779
$U_N = 500 \text{ V}$						
0600A-5	0590A-5	R8i	450	286	510	324
0900A-5	0810A-5	R8i	675	429	765	487
1200A-5	0590A-5	2×R8i	899	572	1020	649
1800A-5	0810A-5	2×R8i	1349	859	1529	973
$U_N = 690 \text{ V}$						
0400A-7	0410A-7	R8i	300	263	340	298
0600A-7	0600A-7	R8i	450	395	510	448
0800A-7	0410A-7	2×R8i	600	527	680	597
1200A-7	0600A-7	2×R8i	899	790	1020	895

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■ Definitions

U_N Supply voltage range. For U_1 , see [Input power \(DC bus\) connection](#) on page 112. For U_2 , see [Output power \(energy storage\) connection](#) on page 112.

Nominal ratings

I_1 DC input current

I_2 Continuous output current (RMS)

P_{contmax} Maximum continuous active power

S_N Nominal apparent power

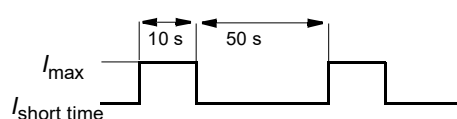
$I_{\text{max output}}$ Maximum output current

I_{p2p} Peak-to-peak value of output current ripple measured after the filter

$f_{\text{sw out}}$ Switching frequency at output terminals (energy storage connection) measured after the filter

Light-duty use

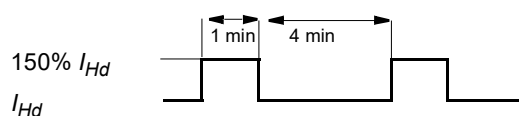
$I_{\text{short time}}$ Continuous current allowing I_{max} for 10 s / 60 s at 40 °C (104 °F)



$P_{\text{short time}}$ Continuous power allowing I_{max} for 10 s / 60 s at 40 °C (104 °F)

Heavy-duty use

I_{Hd} Continuous current allowing 150% I_{Hd} for 1 min / 5 min at 40 °C (104 °F)



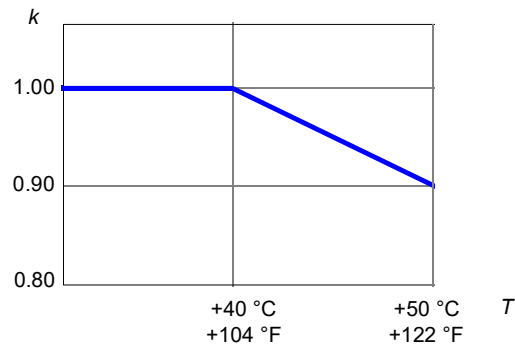
P_{Hd} Continuous power allowing 150% I_{Hd} for 1 min / 5 min at 40 °C (104 °F)

Notes: The ratings apply at an ambient temperature of 40 °C (104 °F).
The ratings apply to units without option +C132 (marine type approval). For ratings of units with option +C132, see [ACS880+C132 marine type-approved drive cabinet supplement](#) (3AXD50000039629 [English]).

Derating

Temperature derating

In the temperature range +40...50 °C (+104...122 °F), the rated output current is derated by 1% for every added 1 °C (1.8 °F). The output current can be calculated by multiplying the current given in the rating table by the derating factor (k):



Altitude derating

At altitudes 0 ... 1000 m (3300 ft), no derating. At altitudes from 1000 to 4000 m (3300 to 13123 ft) above sea level, the continuous output currents given above must be derated 1% for every 100 m (328 ft).

Fuses

■ DC fuses (DC bus side)

Unit type ACS880-1607-...	Rating	Type	Example (Bussman)	Qty
$U_N = 400\text{ V}$				
0600A-3	1100 A, 690 V, size 3	Flush end type	170M6415	2
0900A-3	1600 A, 690 V, size 3	Flush end type	170M6419	2
1200A-3	1100 A, 690 V, size 3	Flush end type	170M6415	4
1800A-3	1600 A, 690 V, size 3	Flush end type	170M6419	4
$U_N = 500\text{ V}$				
0600A-5	1100 A, 690 V, size 3	Flush end type	170M6415	2
0900A-5	1600 A, 690 V, size 3	Flush end type	170M6419	2
1200A-5	1100 A, 690 V, size 3	Flush end type	170M6415	4
1800A-5	1600 A, 690 V, size 3	Flush end type	170M6419	4
$U_N = 690\text{ V}$				
0400A-7	700 A, 1250 V, size 3	Flush end type	170M6545	2
0600A-7	1100 A, 1000 V, size 3	Flush end type	170M6549	2
0800A-7	700 A, 1250 V, size 3	Flush end type	170M6545	4
1200A-7	1100 A, 1000 V, size 3	Flush end type	170M6549	4

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■ Output DC fuses (energy storage side)

Unit type ACS880-1607-...	Rating	Type	Example (Bussman)	Qty
$U_N = 400\text{ V}$				
0600A-3	1100 A, 690 V, size 3	Flush end type	170M6415	2
0900A-3	1600 A, 690 V, size 3	Flush end type	170M6419	2
1200A-3	1100 A, 690 V, size 3	Flush end type	170M6415	4
1800A-3	1600 A, 690 V, size 3	Flush end type	170M6419	4
$U_N = 500\text{ V}$				
0600A-5	1100 A, 690 V, size 3	Flush end type	170M6415	2
0900A-5	1600 A, 690 V, size 3	Flush end type	170M6419	2
1200A-5	1100 A, 690 V, size 3	Flush end type	170M6415	4
1800A-5	1600 A, 690 V, size 3	Flush end type	170M6419	4
$U_N = 690\text{ V}$				
0400A-7	700 A, 1250 V, size 3	Flush end type	170M6545	2
0600A-7	1100 A, 1000 V, size 3	Flush end type	170M6549	2
0800A-7	700 A, 1250 V, size 3	Flush end type	170M6545	4
1200A-7	1100 A, 1000 V, size 3	Flush end type	170M6549	4

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BDCL filters

Each DC/DC converter module has its own BDCL filter module.

Unit type ACS880-1607-...	Frame	BDCL filter type
$U_N = 400\text{ V}$		
0600A-3	1×R8i	1×BDCL-14-5
0900A-3	1×R8i	1×BDCL-15-5
1200A-3	2×R8i	2×BDCL-14-5
1800A-3	2×R8i	2×BDCL-15-5
$U_N = 500\text{ V}$		
0600A-5	1×R8i	1×BDCL-14-5
0900A-5	1×R8i	1×BDCL-15-5
1200A-5	2×R8i	2×BDCL-14-5
1800A-5	2×R8i	2×BDCL-15-5
$U_N = 690\text{ V}$		
0400A-7	1×R8i	1×BDCL-14-7
0600A-7	1×R8i	1×BDCL-15-7
0800A-7	2×R8i	2×BDCL-14-7
1200A-7	2×R8i	2×BDCL-15-7

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Filter module data

Filter module	Nominal inductance / phase	Saturated inductance / phase	Saturated current / phase	DC resistance / phase
BDCL-14-5/-7	540 μH	140 μH	850 A	7 m Ω
BDCL-15-5/-7	360 μH	120 μH	1200 A	7 m Ω

Dimensions and weights

Unit type ACS880-1607- ...	Height 1		Height 2		Width 1		Depth 1		Depth 2		Weight	
	mm	in	mm	in	mm	in	mm	in	mm	in	kg	lbs
$U_N = 400\text{ V}$												
0600A-3	2145	84.4	2315	91.1	800	31.5	636	25	756	29.8	650	1433
0900A-3	2145	84.4	2315	91.1	800	31.5	636	25	756	29.8	680	1499
1200A-3	2145	84.4	2315	91.1	1600	63.0	636	25	756	29.8	1300	2866
1800A-3	2145	84.4	2315	91.1	1600	63.0	636	25	756	29.8	1360	2998
$U_N = 500\text{ V}$												
0600A-5	2145	84.4	2315	91.1	800	31.5	636	25	756	29.8	650	1433
0900A-5	2145	84.4	2315	91.1	800	31.5	636	25	756	29.8	680	1499
1200A-5	2145	84.4	2315	91.1	1600	63.0	636	25	756	29.8	1300	2866
1800A-5	2145	84.4	2315	91.1	1600	63.0	636	25	756	29.8	1360	2998
$U_N = 690\text{ V}$												
0400A-7	2145	84.4	2315	91.1	800	31.5	636	25	756	29.8	650	1433
0600A-7	2145	84.4	2315	91.1	800	31.5	636	25	756	29.8	680	1499
0800A-7	2145	84.4	2315	91.1	1600	63.0	636	25	756	29.8	1300	2866
1200A-7	2145	84.4	2315	91.1	1600	63.0	636	25	756	29.8	1360	2998

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Definitions

Height 1 Normal height (IP22, IP42)

Height 2 Height with IP54 roof

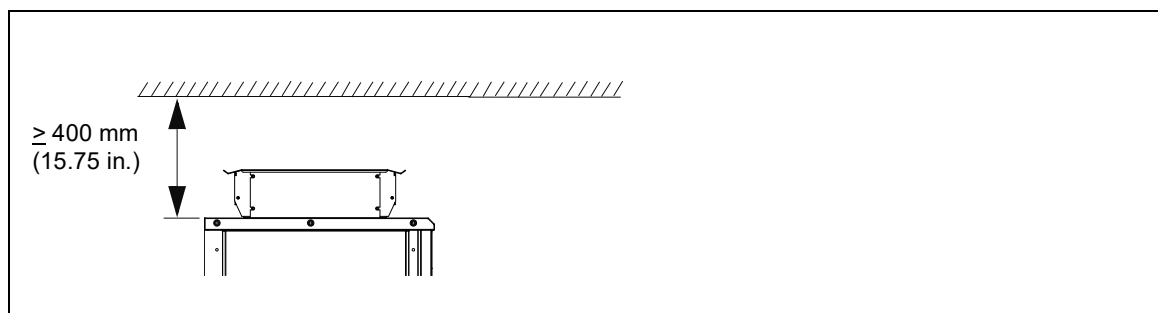
Width 1 Normal width

Depth 1 Without option +C128 Cooling air through bottom

Depth 2 If option +C128 Cooling air through bottom is selected due to extra air inlet channel at the bottom

Free space requirements

Leave 400.0 mm (15.75 in) free space above the basic roof level.



For the rest of the free space requirements, see *Mechanical installation instructions for ACS880 multidrive cabinets* (3AUA0000101764 [English]).

Losses, cooling data and noise

Unit type ACS880-1607-...	Frame	P_{loss}	Air flow		Noise	Efficiency
		kW	m ³ /h	ft ³ /min	dB	%
$U_N = 400 \text{ V}$						
0600A-3	R8i	5.2	2200	1295	74	98.3
0900A-3	R8i	8.0	2200	1295	74	98.3
1200A-3	2×R8i	10.5	4400	2590	76	98.3
1800A-3	2×R8i	16.5	4400	2590	76	98.2
$U_N = 500 \text{ V}$						
0600A-5	R8i	6.0	2200	1295	74	98.5
0900A-5	R8i	9.1	2200	1295	74	98.4
1200A-5	2×R8i	12.1	4400	2590	76	98.4
1800A-5	2×R8i	18.8	4400	2590	76	98.4
$U_N = 690 \text{ V}$						
0400A-7	R8i	6.4	2200	1295	74	98.2
0600A-7	R8i	10.6	2200	1295	74	98.0
0800A-7	2×R8i	12.8	4400	2590	76	98.2
1200A-7	2×R8i	21.5	4400	2590	76	98.0

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Definitions

P_{loss} Heat dissipation. Maximum total losses of the DC/DC converter and BDCL filter with full output power

Noise Noise (DC/DC converter and BDCL filter)

Tightening torques

Unless a tightening torque is specified in the text, the following torques can be used.

■ Cable lugs

Size	Max. torque	Note
M8	15 N·m (11 lbf·ft)	Strength class 8.8
M10	32 N·m (23.5 lbf·ft)	Strength class 8.8
M12	50 N·m (37 lbf·ft)	Strength class 8.8

■ Electrical connections

Size	Torque	Note
M3	0.5 N·m (4.4 lbf·in)	Strength class 4.6...8.8
M4	1 N·m (9 lbf·in)	Strength class 4.6...8.8
M5	4 N·m (35 lbf·in)	Strength class 8.8
M6	9 N·m (6.6 lbf·ft)	Strength class 8.8
M8	22 N·m (16 lbf·ft)	Strength class 8.8
M10	42 N·m (31 lbf·ft)	Strength class 8.8
M12	70 N·m (52 lbf·ft)	Strength class 8.8
M16	120 N·m (90 lbf·ft)	Strength class 8.8

■ Mechanical connections

Size	Max. torque	Note
M5	6 N·m (53 lbf·in)	Strength class 8.8
M6	10 N·m (7.4 lbf·ft)	Strength class 8.8
M8	24 N·m (17.7 lbf·ft)	Strength class 8.8

■ Insulation supports

Size	Max. torque	Note
M6	5 N·m (44 lbf·in)	Strength class 8.8
M8	9 N·m (6.6 lbf·ft)	Strength class 8.8
M10	18 N·m (13.3 lbf·ft)	Strength class 8.8
M12	31 N·m (23 lbf·ft)	Strength class 8.8

Input power (DC bus) connection

Voltage (U_1)	<p>ACS880-104-xxxx-3 = DC voltage corresponding AC input voltages 3 ~ 380...415 V. This is indicated in the type designation label as typical input voltage level 566 V DC.</p> <p>ACS880-104-xxxx-5 = DC voltage corresponding AC input voltages 3 ~ 380...500 V. This is indicated in the type designation label as typical input voltage levels 566 / 679 / 707 V DC.</p> <p>ACS880-104-xxxx-7 = DC voltage corresponding AC input voltages 3 ~ 525...690 V. This is indicated in the type designation label as typical input voltage levels 742 / 849 / 976 (849 UL/CSA) V DC.</p>
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Output power (energy storage) connection

Voltage (U_2)	<p>ACS880-104-xxxx-3 = Maximum output voltage 50 V...95% of U_{DC} (Drive DC voltage in the DC bus). This is indicated in the type designation label as typical output voltage range 50...509 V DC.</p> <p>Recommended output voltage 150 V...80% of U_{DC}.</p> <p>ACS880-104-xxxx-5 = Maximum output voltage 50 V...95% of U_{DC} (Drive DC voltage in the DC bus). This is indicated in the type designation label as typical output voltage range 50...509 / 611 / 636 V DC.</p> <p>Recommended output voltage 150 V...80% of U_{DC}.</p> <p>ACS880-104-xxxx-7 = Maximum output voltage 50 V...95% of U_{DC} (Drive DC voltage in the DC bus). This is indicated in the type designation label as typical output voltage range 50...668 / 764 / 878 V DC.</p> <p>Recommended output voltage 150 V...80% of U_{DC}.</p>
Current	See section Ratings .
Output terminals	See Dimensions .
Maximum energy storage cable length	100 m (328 ft)

Control accuracy – Current and voltage control performance data

Current control dynamic response	Step response time < 10 ms for a reference step 0% to 50% of the drive nominal current)
Current control accuracy (static)	Current error < 1% of the drive nominal current rating For the DC current ripple, see Ratings on page 103.
ES voltage control accuracy (static)	<p>Voltage error < 1% of the drive nominal voltage (converter with the optional BAMU voltage/current measurement unit, option +G442)</p> <p>Note: If the converter does not include the BAMU voltage/current measurement unit, the voltage measurement accuracy depends on the customer's measurement device.</p>

Control unit connection data

See chapter [Control unit](#) on page 53.

Optical components

The specifications of the optic cable are as follows:

- Storage temperature: -55 ... +85 °C (-67 ... +185 °F)
- Installation temperature: -20 ... +70 °C (-4 ... +158 °F)
- Maximum short-term tensile force: 50 N (11.2 lbf)
- Minimum short-term bend radius: 25 mm (0.98 in)
- Minimum long-term bend radius: 35 mm (1.4 in)
- Maximum long-term tensile load: 1 N (0.22 lbf)
- Flexing: Max. 1000 cycles

ABB drive products in general utilize 5 and 10 MBd (megabaud) optical components from Avago Technologies' Versatile Link range. Note that the optical component type is not directly related to the actual communication speed.

Note: The optical components (transmitter and receiver) on a fiber optic link must be of the same type.

Plastic optical fiber (POF) cables can be used with both 5 MBd and 10 MBd optical components. 10 MBd components also enable the use of Hard Clad Silica (HCS[®]) cables, which allow longer connection distances thanks to their lower attenuation. HCS[®] cables cannot be used with 5 MBd optical components.

The maximum lengths of fiber optic links for POF and HCS[®] cables are 20 and 200 meters respectively.

Degree of protection

Degrees of protection (IEC/EN 60529)	IP22 / UL Type 1 (standard), IP42 / UL Type 1 (option +B054), IP54 / UL Type 12 (option +B055)
	IP20 with doors open.

Ambient conditions

The unit is to be used in a heated indoor controlled environment.

	Operation	Storage	Transportation
Altitude above sea level	0...2000 m (0...6561.7 ft)	-	-
	For altitudes over 2000 m (6561.7 ft), contact ABB.		
Air temperature	0...+40 °C (+32...+104 °F), no condensation allowed	-40...+70 °C (-40...+158 °F)	-40...+70 °C (-40...+158 °F)
	+40...+50 °C (+104...+122 °F) derating 1% /1 °C (+1.8 °F). For more information, see Temperature derating on page 106.		
Relative humidity	Maximum 95%, no condensation allowed	Maximum 95%, no condensation allowed	Maximum 95%, no condensation allowed
Contamination	IEC/EN 60721-3-3:2002: Classification of environmental conditions - Part 3-3: Classification of groups of environmental parameters and their severities Stationary use of weather protected locations	IEC 60721-3-1	IEC 60721-3-2
Chemical gases	Class 3C2	Class 1C2	Class 2C2
Solid particles	Class 3S1	Class 1S3 (packing must support this, otherwise 1S2)	Class 2S2
	No conductive dust allowed.		
Vibration IEC/EN 61800-5-1 IEC 60068-2-6:2007, EN 60068-2-6:2008 Environmental testing Part 2: Tests –Test Fc: Vibration (sinusoidal)	IEC/EN 60721-3-3:2002 10...57 Hz: max. 0.075 mm amplitude 57...150 Hz: 1 g Units with marine construction (option +C121): Max. 1 mm (0.04 in.) (5 ... 13.2 Hz), max. 0.7 g (13.2 ... 100 Hz) sinusoidal)	IEC/EN 60721-3-1:1997 10...57 Hz: max. 0.075 mm amplitude 57...150 Hz: 1 g	IEC/EN 60721-3-2:1997 2...9 Hz: max. 3.5 mm amplitude 9...200 Hz: 10 m/s ² (32.8 ft/s ²)
Shock IEC 60068-2-27:2008 EN 60068-2-27:2009 Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock	Not allowed	With packing max. 100 m/s ² (330 ft./s ²) 11 ms	With packing max. 100 m/s ² (330 ft./s ²) 11 ms

Materials

Module enclosure	Hot-dip zinc coated steel sheet 1.5 ... 3.0 mm, thickness of coating 20 micrometers
Module coating	Lexan 8B35 polycarbonate film, color PMS 1C Cool Gray and PMS Process Black
Cabinet frame and panels	Hot-dip zinc coated steel sheet, thickness of coating 20 micrometers. Doors, panels 1.5 mm, frame beams 2 mm, panels inside the cabinet 1 ... 3 mm.
DC busbars	Aluminum (standard) or copper (option +G315/UL).
Cabinet paint coating	Polyester thermosetting powder coating (thickness approximately 80 micrometers) on visible surfaces, color RAL 7035 and RAL 9017. PC/ABS 3 mm, color NCS 1502-Y (RAL 9002 / PMS 1C Cool Gray).
Fire safety of materials (IEC 60332-1)	Insulating materials & non-metallic items: Mostly self-extinctive
Package	<p>Standard package:</p> <ul style="list-style-type: none"> • timber, polyethylene sheet (thickness 0.15 mm), stretch film (thickness 0.023 mm), PP tape, PET strap, sheet metal (steel) • for land and air transport when planned storage time is < 2 months or when storage can be arranged in clean and dry conditions < 6 months • can be used when products will not be exposed to corrosive atmosphere during transport or storage <p>Container package:</p> <ul style="list-style-type: none"> • timber, VCI sheet film (PE, thickness 0.10 mm), VCI stretch film (PE, thickness 0.04 mm), VCI emitter bags, PP tape, PET strap, sheet metal (steel) • for sea transport in containers • recommended for land and air transport when storage time prior to installation exceeds 6 months or storage is arranged in partially weather-protected conditions <p>Seaworthy package:</p> <ul style="list-style-type: none"> • timber, plywood, VCI sheet film (PE, thickness 0.10 mm), VCI stretch film (PE, thickness 0.04 mm), VCI emitter bags, PP tape, PET strap, sheet metal (steel) • for sea transport with or without containerization • for long storage periods in environments where roofed and humidity-controlled storage cannot be arranged
Disposal	<p>The main parts of the drive can be recycled to preserve natural resources and energy. Product parts and materials should be dismantled and separated.</p> <p>Generally all metals, such as steel, aluminum, copper and its alloys, and precious metals can be recycled as material. Plastics, rubber, cardboard and other packaging material can be used in energy recovery. Printed circuit boards and large electrolytic capacitors need selective treatment according to IEC 62635 guidelines. To aid recycling, plastic parts are marked with an appropriate identification code.</p> <p>Please contact your local ABB distributor for further information on environmental aspects and recycling instructions for professional recyclers. End of life treatment must follow international and local regulations.</p>

Applicable standards

See *Electrical planning instructions for ACS880 multidrive cabinets and modules* (3AUA0000102324 [English]).

Markings

See *Electrical planning instructions for ACS880 multidrive cabinets and modules* (3AUA0000102324 [English]).

Disclaimer

■ Generic disclaimer

The manufacturer shall have no obligation with respect to any product which (i) has been improperly repaired or altered; (ii) has been subjected to misuse, negligence or accident; (iii) has been used in a manner contrary to the manufacturer's instructions; or (iv) has failed as a result of ordinary wear and tear.

■ Cybersecurity disclaimer

This product is designed to be connected to and to communicate information and data via a network interface. It is the Customer's sole responsibility to provide and continuously ensure a secure connection between the product and Customer network or any other network (as the case may be). The Customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.



11

Dimensions

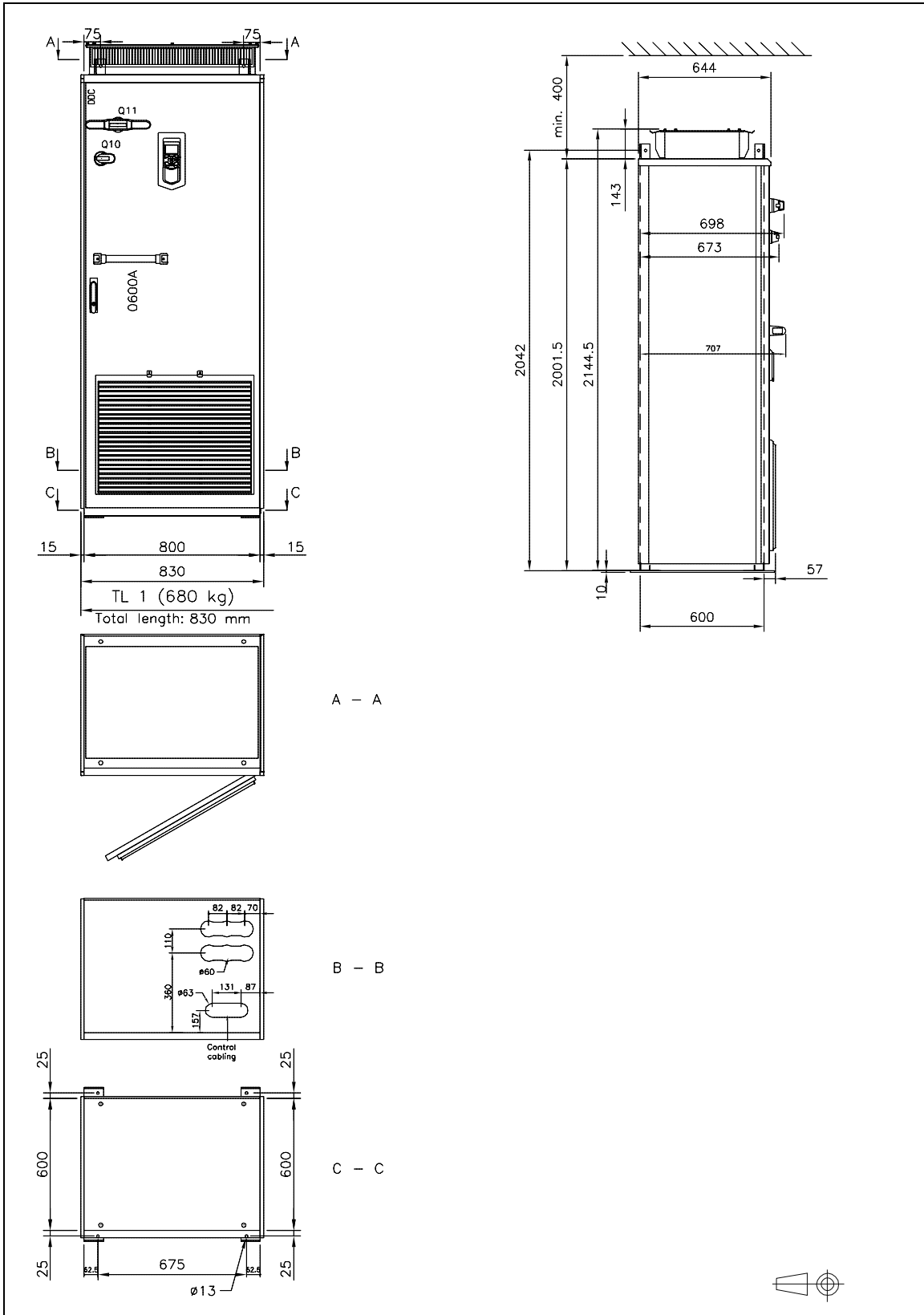
What this chapter contains

This chapter contains the following dimension data:

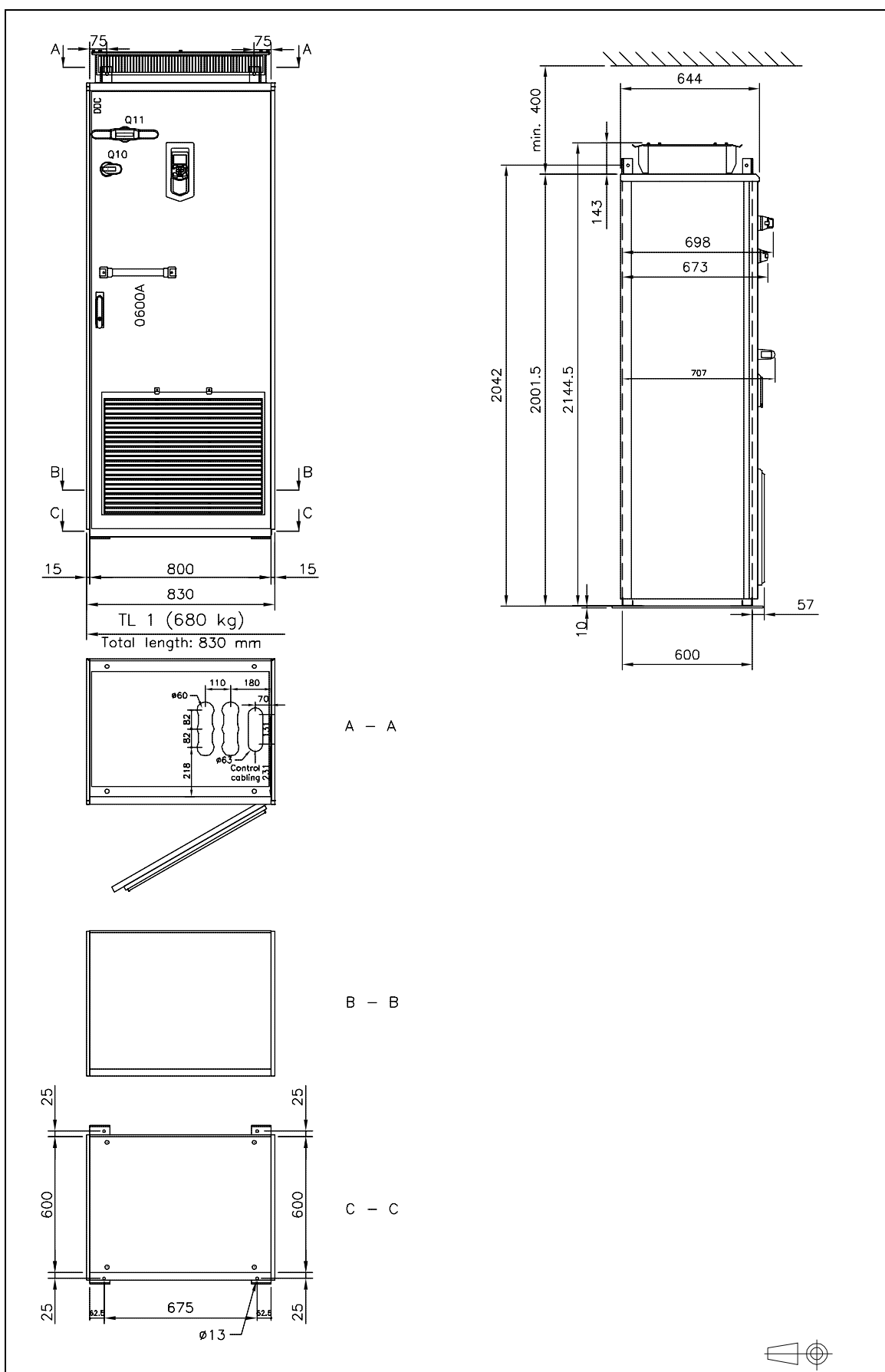
- Dimension drawings of DC/DC converter unit
- Location and size of output terminals for energy storage cables

Dimension drawings

■ Frame 1×R8i, bottom cable entry

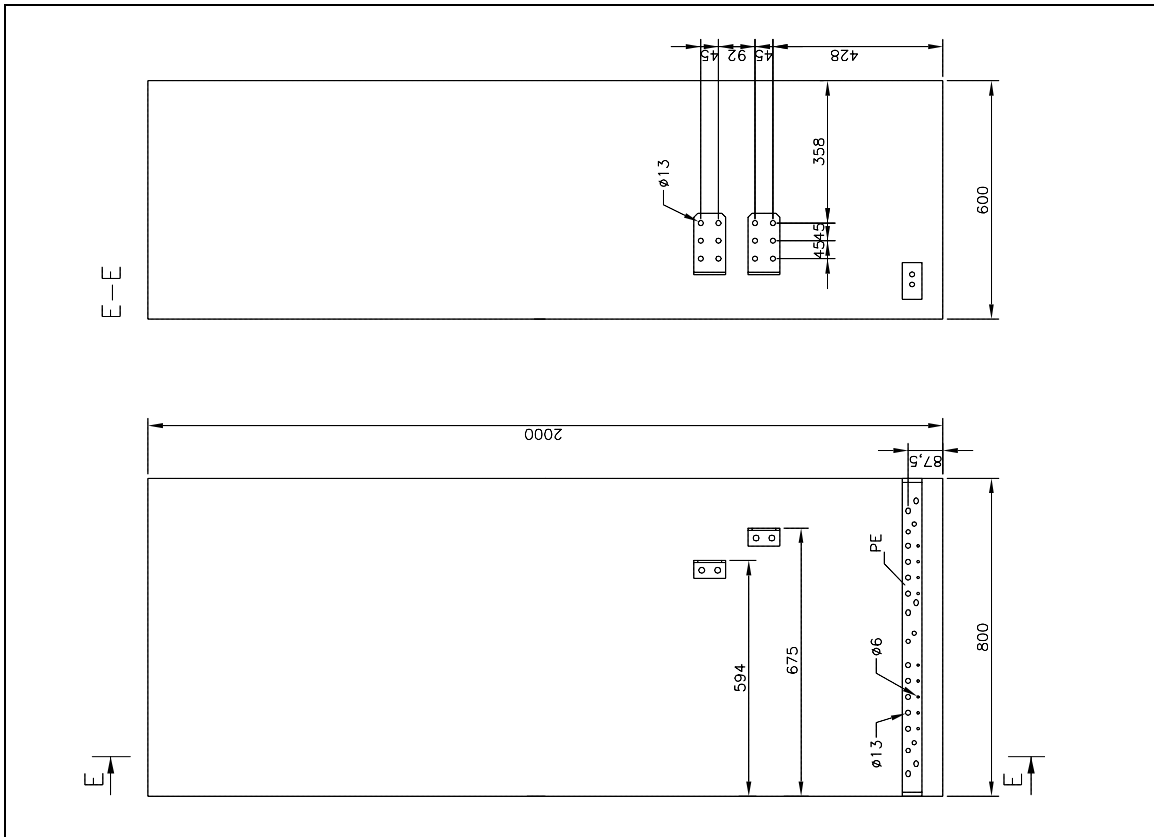


■ Frame 1×R8i, top cable entry

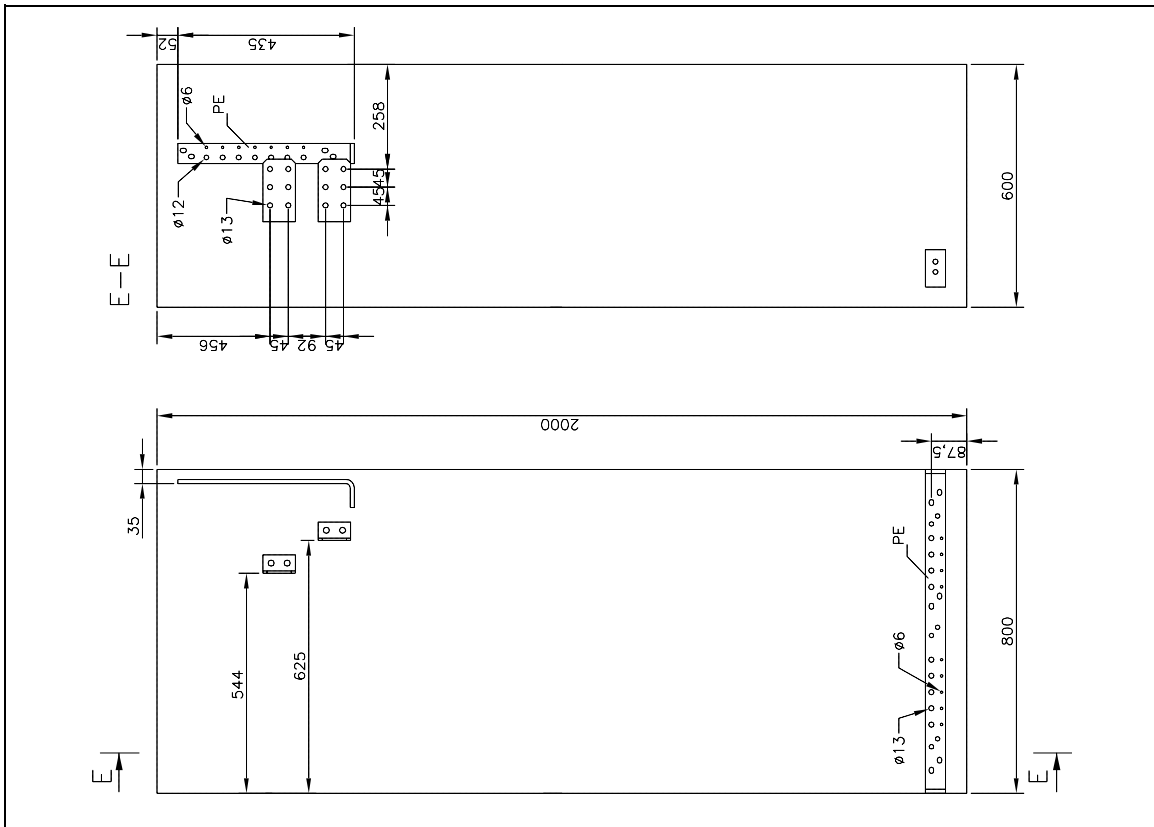


Location and size of input terminals

■ Frame 1×R8i, bottom cable entry



■ Frame 1×R8i, top cable entry





Further information

Product and service inquiries

Address any inquiries about the product to your local ABB representative, quoting the type designation and serial number of the unit in question. A listing of ABB sales, support and service contacts can be found by navigating to abb.com/searchchannels.

Product training

For information on ABB product training, navigate to new.abb.com/service/training.

Providing feedback on ABB Drives manuals

Your comments on our manuals are welcome. Navigate to new.abb.com/drives/manuals-feedback-form.

Document library on the Internet

You can find manuals and other product documents in PDF format on the Internet at abb.com/drives/documents.



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